LANDS DIRECTORATE

DIRECTION GENERALE DES TERRES

Environment Canada Environnement Canada
3021000J DEPT PWM EXCH COPY 03
HD 107 .A5713
VOL ISS 32
WORKING PAPER (CANADA. LANDS DIRECT
ORATE.)

THE IMPACTS ON LAND USE OF CMHC MUNICIPAL INFRASTRUCTURE ASSISTANCE, 1961 TO 1980

WORKING PAPER No. 32

84- 4280 /

THE IMPACTS ON LAND USE OF CMHC MUNICIPAL INFRASTRUCTURE ASSISTANCE, 1961 TO 1980

PAUL D. BIRCHAM AND
WAYNE K. BOND

March, 1984

A report of the Land-Use Policy and Research Branch program which analyses the impact of federal activities on the use and maintenance of Canada's land resource.

Lands Directorate
Environment Canada

Working Paper No. 32

Disponible en français sous le titre:

Incidences sur l'utilisation des terres des subventions aux infrastructures municipales de la SCHL, 1961 à 1980

Minister of Supply and Services Canada 1984

Cat. No. En 73-4/32E
ISBN 0-662-13101-0

PREFACE

This paper is one of a series of reports on the land-use impacts of federal policies and programs. Despite the fact that the jurisdiction over the regulation and control of land use within the provinces belongs to the provincial governments, many federal government programs affect the capability, use, or management of Canada's land resource. Some federal activities directly affect land use through, for example, the purchase of farmland, the management of a national park, or the construction of an airport. Other programs influence the use of the nation's land in a significant but less direct way, through activities such as regulation, research, regional development incentives, financial assistance to an economic sector, or tariffs and taxation.

In recognition of these influences, the federal cabinet approved the Federal Policy on Land Use in 1981 (Canada/Government of Canada, 1981). The goal of this policy is to ensure that federal policies and programs and the management of federal lands contribute to the wise use of Canada's land resource. Such concerns as the preservation of high quality agricultural land, the maintenance of public access to recreation lands, the sound management of land used to produce renewable resources, and the encouragement of wise use of hazard-prone lands are included in the Policy. It provides a series of guidelines which should be applied in the planning and administration of all federal government programs with respect to land use.

It is important that the federal government be aware of the actual or potential effects of its various policies on land and its use. To achieve this goal, the Lands Directorate of Environment Canada has undertaken this series of studies on the impact of federal policies and programs on land use.

Within the federal government, over 800 programs have been identified for their potential impact on land use. These programs have been classified according to their socio-economic sector (agriculture, urban, transport, etc.), and the means by which they can affect land (ownership, regulation, financial assistance, research, etc.). It is not possible to examine all of these programs, so a selection is being made on the basis of this classification. These studies are intended as overviews of the land-use effects of a program rather than as assessments of the effectiveness or efficiency of a program.

The municipal infrastructure assistance programs of Canada Mortgage and Housing Corporation (CMHC) are examples of financial assistance programs for urban infrastructure that have both direct effects on the location, form, and rate of urban development and indirect effects on the use of the surrounding rural land resource.

This program is one of the first to be examined for land-use effects. Therefore, one of the prime aims in undertaking this study was the development of methodology for assessing land-use impact.

The information in this and other reports on federal program imapcts is intended to accomplish two important goals. First, the information should be of use to those charged with administering the type of programs studied, making them aware of the actual and important potential impacts of their actions on land use. Administrators will therefore be in a better position to assess the full consequences of given actions. Second, federal policy-makers responsible for broad government actions will be informed of the effects that certain types of programs have on land use and will therefore be better able to appreciate the consequences of those actions.

RÉSUMÉ

Il s'agit d'une étude des répercussions, sur l'utilisation des terres, des programmes de la SCHL d'aide à la construction de réseaux d'adduction et d'évacuation des eaux, totalisant plus de deux milliards de dollars en prêts et trois quarts de milliard de dollars en subventions destinés aux zones urbaines, entre 1961 et 1980. L'analyse de ces répercussions comprend l'étude de l'effet de leviers financier et foncier. L'étude des dépenses révèle peu de signes d'une augmentation soutenue des immobilisations totales pour l'infrastructure municipale: les programmes de la SCHL ont eu un effet de levier financier limité. Les montants consacrés au financement des infrastructures par la SCHL et les caractéristiques de l'urbanisation des terres rurales sont des variables utilisées dans cette analyse. Les résultats de la comparaison statistique de ces variables, de même que les renseignements recueillis, en entrevue, auprès de planifacteurs de 22 centres ou zones portent à croire que les incidences de ce financement par la SCHL sur l'ampleur, l'emplacement, la forme, et l'ordonnancement du développement urbain dépendaient, en grande partie, de l'existence, de la nature et de l'efficacité de la planification provinciale et locale des terres.

EXECUTIVE SUMMARY

Canada's urban population grew at an unprecedented rate in the post-World War II era. In the decade 1966 to 1976 alone, the urban area of the 80 largest centres in the country grew by almost 30%. The Federal Government has participated in a variety of ways in meeting and expanding the demand for residential land, mainly at the urban periphery. Provision of sewerage infrastructure has been employed effectively to influence the location, phasing, and type of urban development (i.e. infill/redevelopment versus scattered or peripheral growth). This study has investigated and evaluated the impact on land use of three CMHC subsidy programs which assisted in urban infrastructure development and water pollution abatement between 1961 and 1980. These programs provided over two billion dollars in loans at favourable rates to up to two-thirds of the costs of 4,500 projects and grants of three-quarters of a billion dollars for over 6,100 projects. Eligible works varied through the programs, but included sewerage trunks and sewage treatment plants, and in new areas, water supply systems and storm sewers.

The key issue examined is the impact of CMHC infrastructure assistance on the nature, form, and location of development vis-à-vis the rural land resource. Assessment of impact includes both financial leverage (CMHC funding causing infrastructure development to occur) and on-the-ground leverage (the CMHC funded infrastructure influencing the form and location of urban development). This evaluation is from the point of view of impacts on the use and management of the land resource under the guidelines of the Federal Policy on Land Use (Canada/Government of Canada, 1981). The many good aspects of urban development are certainly acknowledged, but are not the concern of this paper.

This report presents the results of three related approaches to the analysis of this issue. The first assessed the degree of financial leverage by CMHC funding on the level of infrastructure capital expenditures by municipalities through statistical comparisons temporally and regionally. CMHC infrastructure assistance was substantial- loans subsidized about one-third of municipal capital expenditures on sewerage and water, and grants paid directly for almost one-tenth of these costs. Nevertheless, there was little evidence that the overall level of municipal infrastructure spending was increased by CMHC funding, except perhaps briefly in the late 1960s and early 1970s. A complex geographical pattern emerged from the analysis; apparently greater potential leverage for increased infrastructure expenditure existed in Ontario and the Atlantic Provinces.

The second approach examined the link between CMHC infrastructure funding and urban development. These analyses utilized two computer data bases containing data on levels of CMHC infrastructure funding (actually MIP-eligible costs) and rural land consumption around 55 large urban centres. Analysis focussed on the relationship of CMHC funding to consumption of rural land, land demand, and the former use and agricultural capability of the land resource. It was found that the infrastructure assistance (compared to population) tended to favour centres which were growing faster and more densely, as well as those which urbanized proportionately more high capability agricultural land and more land already in improved agricultural use.

The third approach explored the on-the-ground impacts with local planners and other personnel. These centres represented a range of population sizes and were geographically distributed across all regions of Canada. Eleven brief case studies are outlined. The key factor in determining the location and nature of development in almost all cases was the presence, nature, and effectiveness of local land strategies and planning. CMHC infrastructure assistance tended to assist in implementation of effective local land strategies. However, development contrary to good planning principles has also been assisted by CMHC moneys when local land plans were absent or not sufficiently comprehensive. In only a few of the examined cases was CMHC funding the critical element in ensuring that specific projects, and hence urban development, proceeded. In the vast majority of instances, local, regional, or provincial land-use or other plans, strategies, or controls were of greater importance in determining the timing, location, form and pattern of urban development.

The major recommendations for the Federal Government in funding of future similar programs may be summarized as follows:

1) give preference to servicing land for infill, redevelopment, or revitilization where choice exists;

2) require evidence of the approval and implementation of local and/or regional land-use plans;

3) require that, to the extent possible, such plans support compact development and protect high capability resource lands;

4) during project screening, ensure that land use concerns under the Federal Policy on Land Use are considered; and

5) in program delivery, allow flexibility in terms of eligible areas, servicing technologies, etc. in order to ensure that the above recommendations are achieved.

While past experience has been mixed, it appears that federal urban infrastructure assistance can be regarded as a potentially positive instrument for reducing water pollution and for encouraging and facilitating contiguous, efficient, and compact urban development at an appropriate rate while minimizing the inappropriate usage and disruption of high capability resource lands (primarily agricultural, but also forestry, and wetlands, and lands with special qualities).

ACKNOWLEDGEMENTS

Preparation of a report such as this inevitably and happily involves the assistance and co-operation of a large number of people. The significant contributions of Jim McRae, Jane Pelton, and Diane Lamoureux are separately acknowledged below. C. Kochar of the Residential and Community Improvement Division of CMHC was a valuable source of information vis-à-vis CMHC activities, policies, and reports. Vera Zaler of the same division provided excellent co-operation in the searching of CMHC archives. Joseph White, Peter Keilhofer, Graham Murray, all of CMHC, provided valuable information and reviews.

Debra Toll collected and coded the data for the CMHC infrastructure programs and provided some preliminary program information. André Hamel coded the data for the urban characteristics data set and compiled loans and infrastructure expenditures data. Reviews of drafts were supplied by C. Kochar and E.W. Manning, Chief of the Land Use Analysis Division, Lands Directorate.

Compilation and drafting of the maps and figures in the report were carried out by Gary E. Thomas, Berend Tol, and other members of the Drafting Division of the Department's Environmental Conservation Service. Carole Aubin-Lalonde and Françoise Mallette provided fine word-processing and undertook the many revisions.

Finally, this study would have been impossible without the numerous urban and regional planners, and other municipal personnel who willingly assisted with the case studies.

SPECIAL CONTRIBUTORS

JIM MCRAE- Jim undertook a review of the literature on the nature, scope, and effects of the CMHC infrastructure assistance programs and held interviews with several CMHC headquarters officials regarding the magnitude and impacts of these funding programs. His research and written review provided the basis for Chapter 3. He also carried out some preliminary cleaning and analysis of the data sets on CMHC infrastructure programs and urban area characteristics.

JANE PELTON- Jane carried out the computer manipulation and analysis of the data sets on CMHC infrastructure assistance programs and the growth characteristics of Canada's major urban areas. The tables produced were critical to the analysis undertaken in Chapter 6. Jane's review of the penultimate draft also assisted in improving the organization and presentation of the report.

DIANE LAMOUREUX- Diane conducted the telephone survey of land use planners for a sample of municipalities assisted by CMHC infrastructure funding in the province of Quebec. The information gathered was essential to the discussion presented in Chapter 7. Diane required considerable perserverance in her survey work because of the low profile of this CMHC assistance program outside of major urban centres and the fragmented municipal jurisdictions in some urban areas of Quebec.

TABLE OF CONTENTS

	Page
PREFACE	iii
RÉSUMÉ	iv
EXECUTIVE SUMMARY	v
ACKNOWLEDGEMENTS	vii
SPECIAL CONTRIBUTORS	vii
LIST OF TABLES	xi
LIST OF FIGURES	xii
1. INTRODUCTION	1
1.1 CMHC Infrastructure Programs: A Brief Overview	1
1.2 Report Outline	4
2. THE LAND IMPACTS OF URBAN GROWTH: NATURE AND PROCESS	6
2.1 Perspective on Urban Growth	6
2.2 Types of Land Impacts	6
2.3 Magnitude of Land Impacts	7
2.4 The Significance of Infrastructure for Urban Growth	9
2.5 The Provincial-Municipal Filter	9
3. CMHC MUNICIPAL INFRASTRUCTURE ASSISTANCE: POTENTIALS FOR LAND-USE IMPACTS	13
3.1 Early History of Federal Infrastracture Assistance	13
3.2 The Beginnings of CMHC Involvement	13
3.3 Nature and Objectives of the Infrastructure Programs 1) Sewage Treatment Program, 1961 to 1974 2) Municipal Infrastructure Program, 1975 to 1978 3) Community Services Contribution Program, 1979 and 1980	14
3.4 Potential Impacts Through Project Type Criteria 1) New Development Versus Infill/Retrofit 2) Pattern/Nature of Growth 3) Research	15
3.5 Potential Impacts Through Funding: Administration, Availability, and Attractiveness 1) Administration 2) Funding Deadlines 3) Availability and Attractiveness of Funding 4) Suburbanization of Industry	18
3.6 Potential Impacts Through the Lack of Enforced Land-Use Planning Criteria	21

		Page
3.7	Program Reviews and Land-Use Impacts	24
3.8	Initial Findings: A Summary	24
4.	RESEARCH STRATEGY: WHAT? AND HOW?	28
4.1	Hypotheses	
	1) Hypothesis 1- CMHC Financial Leverage	28
	2) Hypothesis 2- Relationship of CMHC Assistance to Urban Development Characteristics	
	3) Hypothesis 3- On-the-Ground Leverage	
4.2	Research Approaches	
	1) CMHC Financial Leverage	30
	2) Relationship of CMHC Assistance to the Development of the Land Resource	
	3) On-the-Ground Leverage	
5.	CMHC FUNDING: THE CASE FOR FINANCIAL LEVERAGE	34
5.1	Analysis of Financial Leverage: Temporal	34
5.2	Analysis of Financial Leverage: Geographic	38
6.	RELATIONSHIP OF CMHC INFRASTRUCTURE ASSISTANCE TO URBAN DEVELOPMENT CHARACTERISTICS	42
6.1	The Data	42
6.2	Data Analysis	45
6.3	Greater Urbanization of Rural Land	
	1) Population	48
	2) Land Efficiency of Growth	
6.4	Demand Responsiveness	
	1) Population Growth Rate	50
	2) Urban Area Growth	
	3) Urban Area Growth Rate	
6.5	Land Use and Agricultural Capability of Newly Urbanized Areas	
	1) Improved Agricultural Area	54
	2) Potential Cropland	
7.	ON-THE-GROUND LEVERAGE	61
7.1	The Approach	61
7.2	CMHC Support of Sound Land Use Planning: Case Studies	65
	1) Case A: Huron County, Ontario	
	2) Case B: Winnipeg	
	3) Case C: Regina	
	4) Case D: Kings County, Nova Scotia	
	5) Case E: Chilliwack	

Page

7.3 Mixed or Negative Impacts on Land Use: Case Studies 73

1) Case F: Windsor/Essex County
2) Case G: Niagara Region (Rural Areas below the Escarpment)
3) Case H: Cape Breton County, Nova Scotia
4) Case I: Goulds (St. John's)
5) Case J: Sherbrooke

7.4 Montreal: Case Study 80

7.5 CMHC-Supported Infrastructure and Urban Development: Analysis 84

1) The Question of Leverage
2) Relationship to Local Development Planning

8. LAND-USE IMPACTS OF CMHC INFRASTRUCTURE FUNDING: CONCLUSIONS AND OPPORTUNITIES 91

8.1 Conclusions 91

8.2 Opportunities 93

REFERENCES 95

APPENDIX A: PLANNER INTERVIEW 99

APPENDIX B: THE NATURE OF CMHC-SUBSIDIZED DEVELOPMENT 105

OTHER FEDERAL IMPACT REPORTS 111

WORKING PAPER SERIES 112

LIST OF TABLES

		Page
1.1	Summary of CMHC Assistance for Municipal Infrastructure, 1961 to 1980	2
2.1	Summary of Capital Costs for Various Elements of a Community	10
2.2	Summary of Servicing Costs	11
3.1	Comparison of the Three Municipal Infrastructure Programs	16
3.2	Conclusions and Recommendations: Sewage Treatment Program Review	25
3.3	Interdepartmental Committee: Policy Options and Recommendations	26
4.1	Planner Survey: Population and Regional Stratifications	32
5.1	Significance of CMHC Municipal Infrastructure Funding in Terms of Total Capital Expenditures on Sewerage and Water, 1956 to 1982: Temporal Analysis	36
5.2	Significance of Loans from the Sewage Treatment and Municipal Infrastructure Programs by Province, 1961 to 1978	40
5.3	Significance of CMHC Municipal Infrastructure Loans and Grants 1961 to 1978: A Provincial Comparison	41
6.1	Distribution of CMHC Infrastructure Funding in the MIP Sample: Large Versus Small Centres and Rural Areas	44
6.2	Municipal Infrastructure Program: Types of Projects Assisted, 1975 to 1978 (Sample Only)	46
6.3	Newly Urbanized Land Area, 1966 to 1976, and MIP Eligible Costs	47
6.4	Population of Urban Centre, 1976 and MIP Eligible Costs	49
6.5	Area of Land Urbanized, 1966 to 1976, by Population, 1976	49
6.6	Land Efficiency of Urban Growth, 1966 to 1976 and MIP Eligible Costs	51
6.7	Land Efficiency of Urban Growth in Canada, 1966 to 1976, by Population and Area of Centre	52
6.8	Population Growth Rate, 1966 to 1976 and MIP Eligible Costs	53
6.9	Percent Increase in Urban Area, 1966 to 1976 and MIP Eligible Costs	55
6.10	Area of Improved Land Urbanized, 1966 to 1976 and MIP Eligible Costs	55
6.11	Area of Improved Land Urbanized, 1966 to 1976, by Population, 1976	57
6.12	Percent of Land Urbanized, 1966 to 1976, Which Had Been in Improved Agriculture and MIP Eligible Costs	57
6.13	Area Urbanized, 1966 to 1976, Which Had Been Potential Cropland (CLI Classes 1 to 3) and MIP Eligible Costs	58
6.14	Area of CLI Classes 1 to 3 Land Urbanized, 1966 to 1976, by Population, 1976	58
6.15	Percent of Total Area Urbanized, 1966 to 1976, Which Had Been Potential Cropland (CLI Classes 1 to 3) and MIP Eligible Costs	60

		Page
7.1	CMHC Funding Leverage	86
7.2	Rate of Urban Growth, 1966 to 1976, Versus Type of Urban Development Assisted by CMHC Infrastructure Funding	88
7.3	Potential Influence of CMHC Infrastructure Funding on Local Land Plans/Strategies	89

LIST OF FIGURES

		Page
1.1	CMHC Municipal Infrastructure Funding	3
2.1	Urban Area Characteristics and Magnitude of Land Impacts	8
2.2	Implications for Land Use Near Urban Areas: Federal Government Programs	12
4.1	Study Framework: Land Impacts by CMHC Infrastructure Programs	29
5.1	Financial Leverage Component	35
5.2	Comparison of CMHC Municipal Infrastructure Funding With Capital Expenditures for Sewerage and Water Supply, 1956-1982 in Constant (1982) Dollars	37
6.1	Urban Characteristics Component	43
7.1	On-the-Ground Leverage Component	62
7.2	Location of Sampled Centres/Areas: Planner Survey	63
7.3	Types of Urban Development	64
7.4	Huron County, Ontario (Case A)	66
7.5	Winnipeg (Case B)	68
7.6	Regina (Case C)	70
7.7	Kings County, Nova Scotia (Case D)	71
7.8	Windsor and Environs (Case F)	74
7.9	Windsor/Essex County (Case F)	75
7.10	Niagara (Rural Areas Below the Escarpment- Case G)	77
7.11	Cape Breton County, Nova Scotia (Case H)	79
7.12	Sherbrooke (Case J)	81
7.13	Montréal (Case K)	83

1. INTRODUCTION

In the era between the Second World War and the mid-1970s, Canadians witnessed an unprecedented level of expansion of urban areas both in terms of population growth and physical area. Urban population grew by 62% from 10.7 million in 1956 to 17.4 million by 1976. In the decade up to 1976 alone, the built-up area of Canada's 80 largest centres (those over 25,000 in 1976) expanded by almost 30%, increasing from 510,000 to 660,000 hectares (Warren and Rump, 1981).[a] Much of this expansion was due to residential demands for land, accompanied by the introduction of federally-guaranteed loans and other expansionary housing policies. These demands were due to the post-war baby boom, migration to the larger urban areas, immigration, rising standards of living, the increased expectation of owning a single-family home, and rapid economic growth, especially during the 1960s.

This urban growth has covered some of Canada's highest quality land resource. Land in close proximity to many of Canada's largest urban areas is often the highest quality and most productive agricultural land in the country (Manning and McCuaig, 1977; Neimanis, 1979). More than 55% of this country's best agricultural land (Canada Land Inventory or CLI class 1) lies within 80 kilometres of the largest centres, those over 100,000 (Neimanis, 1979). Over 26% of all agricultural land capable of crop production in Canada (CLI classes 1 to 3) also lies in this zone. Urban expansion has occurred primarily at the expense of this valuable resource- of the total land converted to urban uses between 1966 and 1976, over 62% was CLI classes 1 to 3 (Warren and Rump, 1981). Significant areas of this land were also of high quality (CLI classes 1 to 3) for forestry (24,600 hectares-ha), and wildlife (ungulates- 42,200 ha). The form, pattern, and location of urban growth thus have serious potential implications for the sustainability of production based on the high quality land resources of Canada.

1.1 CMHC Infrastructure Programs: A Brief Overview

Federal government programs for municipal assistance in the development of sewage and water infrastructure in the 1960s and 1970s have been cited as a major influence on urban growth and land use both in Canada (Canada/Interdepartmental Task Force on Land-Use Policy, 1980) and the United States (Council on Environmental Quality, 1976). The major input of the Canadian Government to such infrastructure was through the Canada Mortgage and Housing Corporation (CMHC).[b] Between 1961 and 1980, CMHC's three municipal infrastructure assistance programs loaned over two billion dollars and granted an additional $750 million for the construction of municipal sewage and water projects (Table 1.1) to alleviate pollution and promote residential construction (CMHC, 1979a). Figure 1.1 traces expenditures under these CMHC programs from 1961 to 1980 in current dollars.

From 1961 to 1974, almost 1,900 CMHC loans to municipalities for sewage infrastructure (sewage treatment plants and sanitary trunk sewers) at favourable interest rates (1/8% over prime) totalled $980 million under the Sewage Treatment Program (STP). Thereafter

---

[a] Most of this increase (58%) occurred between 1966 and 1971 (Warren and Rump, 1981).

[b] Before 1978, CMHC was named the Central Mortgage and Housing Corporation.

TABLE 1.1:

SUMMARY OF CMHC ASSISTANCE FOR MUNICIPAL INFRASTRUCTURE, 1961 TO 1980[a]

Program	Number of Loans/ Grants	Loans		Grants[b]		Grants[b] as % of Loans
		Total ($'000,000)	Mean ($'000)	Total ($'000,000)	Mean ($'000)	
Sewage Treatment Program (1961-74)	2,896	$ 979	$338	$131	$ 45	14%
Municipal Infrastructure Program (1975-78)	1,618	$1,025	$633	$395[b]	$245	39%
Community Services Contribution Program (1979-80)	1,613	---	---	$221	$137	NA
Total	6,127	$2,004	NA	$747	NA	NA

NA - Not applicable.

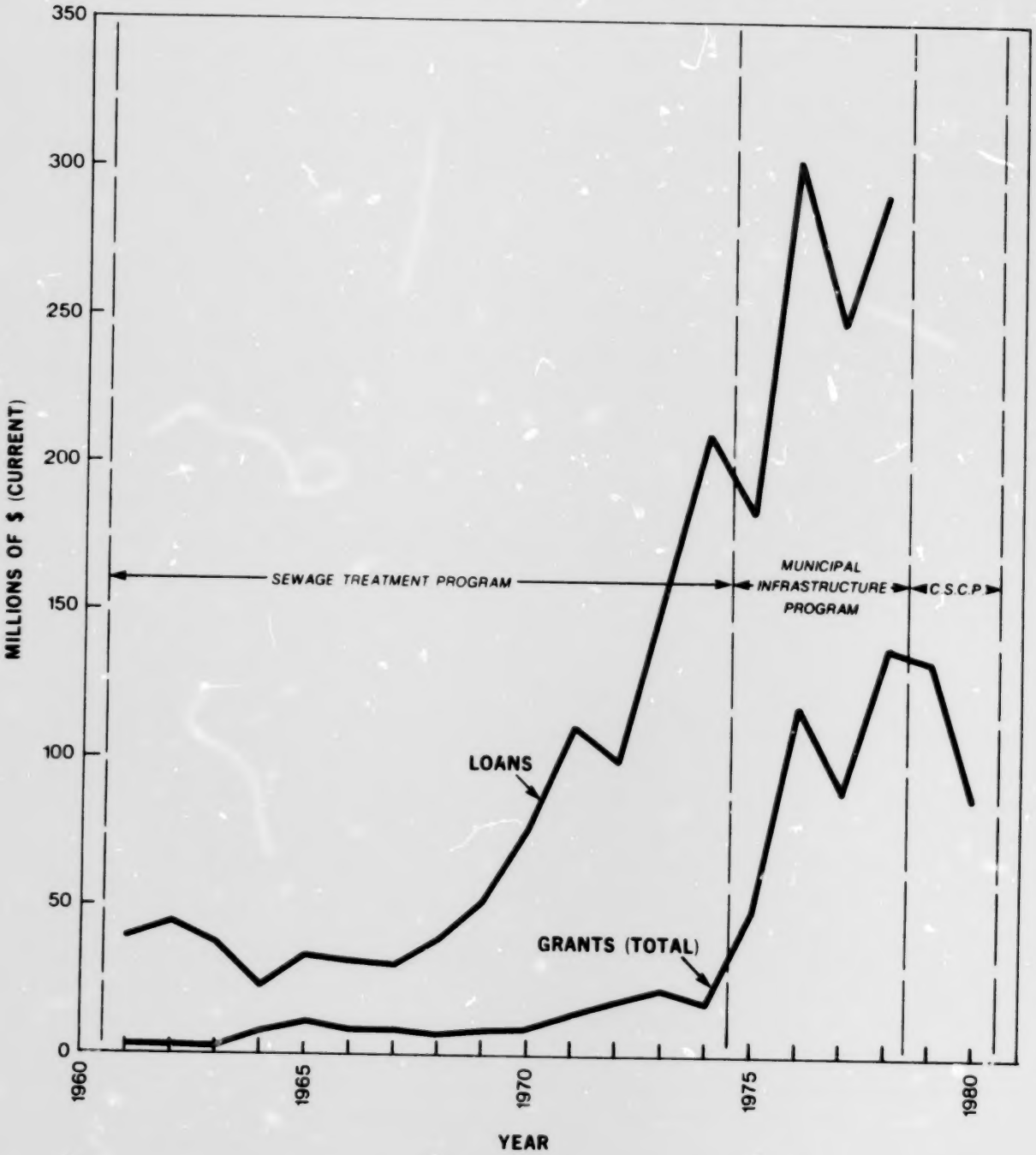
[a] Data are given in unadjusted dollars (i.e., are not adjusted for inflation). Includes some municipal estimates in cases for which projects were not yet finalized.

[b] Includes loan forgiveness, high cost grants (1975-79 only), and grants to non-NHA financed projects (1975-78 only). 1975-78: forgiveness- $207 million; high-cost- $69 million; and non-NHA- $119 million.

SOURCES: CMHC (1962-1983, 1976); Cross (1981).

FIGURE 1.1

C.M.H.C. MUNICIPAL INFRASTRUCTURE FUNDING 1961 TO 1980 (CURRENT DOLLARS)



until 1978, funding of sewage, storm sewer, and water supply infrastructure was assisted was assisted through the Municipal Infrastructure Program (MIP); under it, over 1,600 loans totalling $1,025 million were made. About 92% of all moneys loaned between 1961 and 1978 went to sewage treatment plants and sanitary trunk sewers; the remainder supported storm trunk sewer and water supply projects (CMHC, 1979a). Grants of over $525 million were also expended- almost $340 million in the forgiveable portion of loans, nearly $70 million in grants for high-cost installations (intended for smaller, low-density centres), and almost $120 million in grants to non-NHA financed projects (the latter two in 1975 to 1978 only). In addition, many municipalities realized considerable savings through the low interest feature of the loans. Together, these two programs (through over 4,500 loans with loan forgiveness and over 1,600 grants) assisted infrastructure development in almost 1,500 municipalities inhabited by about 75% of Canada's population (CMHC, 1979a).

In 1979 and 1980, CMHC provided block grants to provinces for community services under the Community Services Contribution Program (CSCP); those used for municipal sewage and water infrastructure totalled an additional $221 million (or 55% of all CSCP grants; Cross, 1981).

1.2 Report Outline

The following chapter (2) provides a brief examination of the kinds and magnitude of potential land impacts of urban growth in Canada. It also discusses the jurisdictional issues in land use in this country and the nature of the role of the federal and provincial governments in land-use planning.

A history of federal infrastructure assistance and a description of the three infrastructure programs follow, including the objectives, breadth, extent of funding, and administration of these programs (Chapter 3). The chapter also discusses the potential impacts on land-use through project criteria, funding, and the lack of enforced land-use planning criteria, based on a review of program documents and discussions with CMHC personnel. In some cases, it has been possible to reach conclusions on the basis of this preliminary work; these are made explicit.

A series of hypotheses on the nature of the land impacts of CMHC infrastructure are presented in Chapter 4. The framework and strategy used to investigate these hypotheses are thereafter described. This study has addressed the link between CMHC municipal infrastructure funding and urban development through a three component analysis:

1) financial leverage- the importance of CMHC funding vis-a-vis infrastructure capital expenditures by municipalities as illustrated by data at the national and regional levels (Chapter 5);

2) an investigation of the relationship of CMHC infrastructure funding to urban growth characteristics and the land urbanized, by capability/land use around urban centres (Chapter 6); and

3) the examination of the actual on-the-ground impacts of infrastructure funding in individual projects and centres (Chapter 7).

This research has involved an extensive literature search, an analysis of municipal capital expenditures data, a survey of 22 planning offices from municipalities across Canada, and a detailed statistical analysis of two computer data bases which linked CMHC funding and urban land consumption characteristics.

The final chapter (8) formulates the conclusions which can be made from these approaches to the investigation. Recommendations regarding the mitigation of negative land impacts and opportunities to encourage wise land use in future similar infrastructure assistance programs conclude the report.

2. THE LAND IMPACTS OF URBAN GROWTH: NATURE AND PROCESS

To assess the importance of the potential land impacts of CMHC infrastructure assistance, it is necessary to begin with a discussion of the nature and extent of land impacts of urban growth. This chapter reviews the analytic perspective on urban growth adopted by this study (section 2.1), the types (2.2) and magnitude of its land impacts (2.3), the importance of infrastructure elements in urban growth (2.4), and the role of provincial and municipal planning and regulation in molding such growth (2.5).

2.1 Perspective on Urban Growth

The analytical perspective adopted in this report follows the Land-Use Guidelines of the Federal Policy on Land Use (Canada/Government of Canada, 1981) which states:

"The federal government will apply the following land-use guidelines to federal policies, programs and activities which may affect land and to the management of its land holdings.

A. The impact of policies and programs on urban land will be considered. Appropriate action will be taken to support urban land use which leads to economically efficient urban areas, and a high quality physical and social environment for urban residents.

B. The impact of policies and programs on land with high agricultural capacity will be considered. Appropriate action will be taken to minimize the conversion of such lands to uses incompatible with long-term food production ..."

In a post-industrial society such as that of Canada, larger urban centres, and urban growth at a moderate rate which does not outstrip the capacity to provide housing and services, are essential and have generally positive consequences for society as whole and its citizens. These include increased economic vitality, enhanced capacity for innovation, access to high levels of professional and community services, and a wide choice of goods and neighbourhood environments. From the perspective of the Policy and this report, however, it is the location, pattern, and form of urban growth that are of concern. There is a need to accommodate urban growth in locations and forms that minimize the consumption and disruption of agriculture, forestry, and other resource-based activity on Canada's limited prime resource lands.

Analyses, based on the Land-Use Guidelines in the Policy, maintain the perspective that (1) urban growth should be located away from prime agricultural land wherever possible and (2) should ideally take place in a compact form that emphasizes contiguous development, infilling, and renewal of older, usually inner city areas. All are in the context of the utilization of the land for the greatest national good.

2.2 Types of Land Impacts

The most visible and obvious effect of urban growth has been rural to urban land conversion. Between 1966 and 1976, almost 149,400 hectares of rural land were converted to urban uses around Canada's 80 largest urban centres (Warren and Rump, 1981). About 62% of this was potential cropland (CLI classes 1 to 3). At least 55% was previously in improved agricultural use; this last figure does not take into account the potential impact of speculation for urban development nor any other urban impacts on the surrounding land resource. For all intents and purposes, this process constitutes a permanent loss of land from agricultural production, as well as from forestry, wildlife, and other rural uses.

The occurrence of direct urbanization on Canada's best agriculture and resource lands makes this loss more serious than the data appear to indicate. Canada's good agricultural land is in relatively short supply. Our very best land (CLI Class 1) amounts to less than one-half of one percent of Canada's land area (4.1 million hectares; Simpson-Lewis et al., 1979). Likewise, less than 5% of Canada's land is considered to be capable of crop production (CLI classes 1 to 3). This land, due to historic settlement patterns, tends to be adjacent to our expanding urban centres. About 57% of all Class 1 land is located within 80 km of our 23 major urban centres alone (Neimanis, 1979). Greater quantities of lower capability land (CLI classes 4 to 6) are required to offset production losses of the better lands through urbanization. It must be considered too that the range of crops grown is also quite severely restricted on these more marginal agricultural lands (i.e. pasture and hay only in most cases; Williams, 1975; Beattie, Bond, and Manning, 1981).

Apart from direct conversion of agricultural land, urban growth may also bring about a lowering in the productivity of prime resource lands on the urban fringe partially through leap-frogging, strip development, scattered rural residences, and speculative land market activity and idling of rural land (McRae, 1980, 1981; Martin, 1975). These phenomena may effectively discourage or prevent efficient and ecologically-sound production practices for agriculture. Nearby urban growth also creates uncertainty and anticipation among the farm population because of high land prices and taxes, nuisance laws, and other factors which lead to the loss of farm population (McRae, 1980; Bryant, Russwurm, and McLellan, 1982). This in turn tends to weaken the rural socio-economic infrastructure (e.g. marketing outlets, machinery and feed dealers, etc.) on which production is based, eventually prompting more farmers to sell their land.

In addition, construction activity, which decreases vegetative cover and surface permeability, can lead to an increase in local runoff, erosion, sedimentation, and the lowering of water tables. The potential of the land for agriculture, recreation activities, and wildlife preservation may thereby be adversely affected.

In summary, urban growth on land in the urban fringe can result in the conversion of good quality resource land to urban uses and the disruption and consequent lowering in productivity of adjacent high quality resource lands.

2.3 Magnitude of Land Impacts

The magnitude of the impact of urban growth on high capability resource lands depends on the characteristics of the urban areas themselves (Figure 2.1). For example, large, low density, and sprawling urban areas undergoing rapid growth are likely to have a greater impact on the surrounding land resource (i.e. through land conversion and/or the lowering of productive use of the land) than are small, high density, and compact urban areas with low growth rates. Of course, the nature and magnitude of land impacts in urban-based regions depends on the extent to which appropriate land policies and land management controls are developed and effectively implemented at each government level.

FIGURE 2.1:

URBAN AREA CHARACTERISTICS AND MAGNITUDE OF LAND IMPACTS

Urban Characteristics	Magnitude of Potential Land Impacts great----------small
Size of centre	large----------small
Density of settlement	low----------high
Pattern of settlement	sprawl----------compact
Growth rate	high----------low
Direction, focus of new growth in region or province	concentration----------deconcentration (dispersion to smaller, slower-growing centres).
Land capability for agriculture encircling urban centre	primarily CLI classes 1 to 3----------primarily CLI classes 4 to 7

2.4 The Significance of Infrastructure for Urban Growth

Infrastructural elements necessary for the development of a new urban area may do much to determine the direction and nature of urban growth. How important is a sewerage system? The US Council on Environmental Quality, in a discussion of the "growth shapers," have noted that (Urban Systems Research and Engineering, 1976, p. 48-49):

> ... sewers have a powerful effect on the location, pattern, and timing of single family residential development....
>
> New development is attracted to areas served by sewers for a variety of reasons. First, consumers prefer houses with sewers; septic tanks require maintenance and are an undesirable responsibility. Second, increased concern for the environment has prompted the extensive (and expensive) construction of sewers.... Third, new communities may deliberately attract new development in order to pay off construction expenses....

The proportion of development costs attributable to sewerage and water expenses varies widely, due to differing development standards and patterns of growth, cost apportionment (private versus public; federal versus provincial/state versus local), construction and land costs, and other factors. Nevertheless, tables 2.1 and 2.2 show that these costs represent on the order of one-quarter of non-residential costs of development. In both cases, they are among the most significant costs.

Moreover, since various infrastructural elements can be used to regulate development, municipalities have the ability to stage the timing of public works. In Ontario at least, this strategy has been widely followed (Ontario Economic Council, 1973, pp. 83, 85):

> Trunk sanitary services are almost invariably selected as the critical utility for determining stages, since their extension requires a certain logical sequence.

A high degree of co-ordination generally exists there between municipal planning and public works, resulting from every day working relationships, especially with respect to utilities, such as sewerage, water, and roads.

2.5 The Provincial-Municipal Filter

The previous section has foreshadowed the importance of local land planning for the impact of infrastructure on development. The land impacts of federal programs, such as CMHC's infrastructure assistance programs, must be examined in the context of the federal influence on land which is under provincial planning and regulation (Figure 2.2). As a result, federal funding programs generally have the potential to influence positively or negatively the preservation of prime land resources. Actual results often depend not only on the goals and the structure of the federal program itself (e.g., the conditions attached to project approval), but also on the nature and effectiveness of local land planning initiatives.

The range of possible land impacts may be viewed as positive or negative from the standpoints of:

1) ensuring allocation of the most suitable land use by land capability;
2) facilitating the growth of compact urban centres; and
3) promoting an array of other land planning goals which vary over time and between jurisdictions, including the decentralization of urban growth to slow growth areas and the direction of development to lower capability agricultural land.

TABLE 2.1:

SUMMARY OF CAPITAL COSTS FOR VARIOUS ELEMENTS OF A COMMUNITY

Cost Category	Capital Costs (%)[a]	Capital Costs (%), Excluding Residential Construction[a]
Residential Construction	56-65%	N/A
Schools	9-16%	26-36%
Sewerage and Water Supply	7-11%	20-25%
Streets and Roads	7-9%	20%
Land	5-6%	14%
Public Facilities	3-6%	9-14%
Energy and Communications	4-5%	11%
	100%	100%

N/A- Not applicable.

[a] These proportions of cost are presented as ranges representing those for six differing types of community development pattern for 10,000 units. These vary from high density planned to low density sprawl and include various densities and levels of planning.

SOURCE: Real Estate Research Corporation (1974, p. 9, 60).

TABLE 2.2:

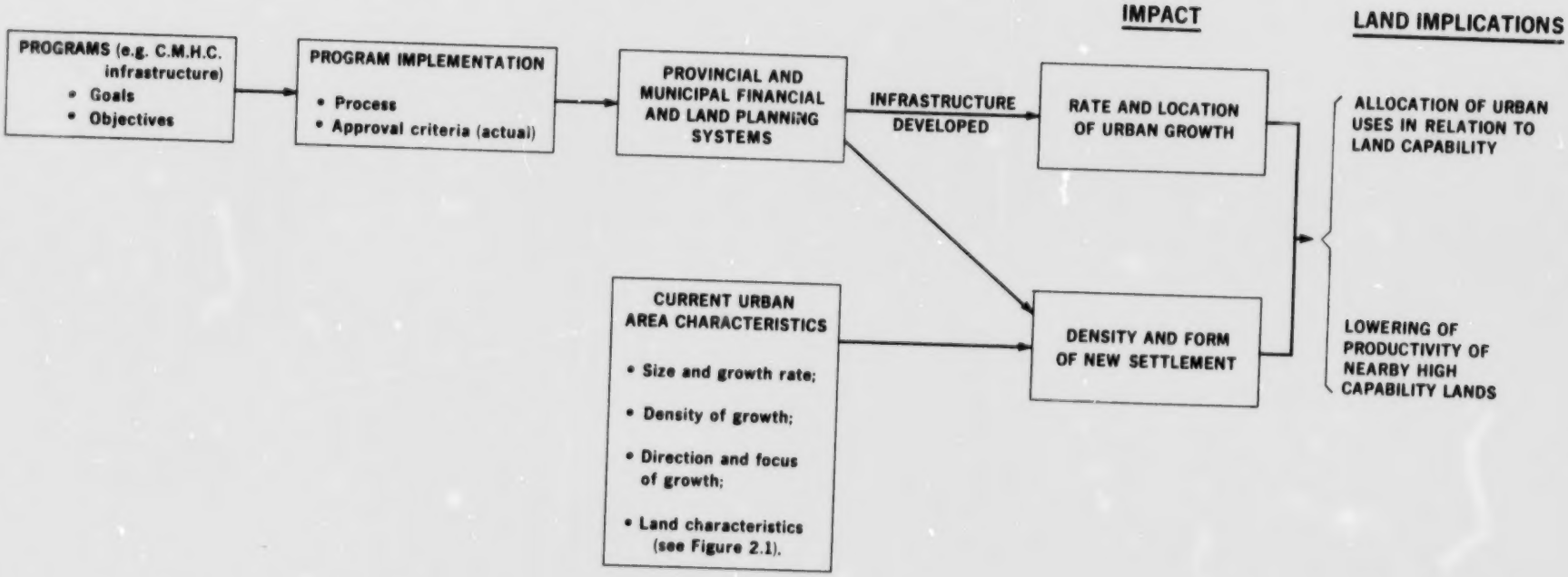
SUMMARY OF SERVICING COSTS
(50 ACRES RESIDENTIAL CONVENTIONAL SUBDIVISION PLAN)

Cost Category	Ontario	Metropolitan[a]
Sewerage and Water Supply	33%	31%
Roadways and Sidewalks	32%	30%
Service Connections	11%	14%
Hydro	11%	13%
Engineering	6%	6%
Street Lighting	3%	2%
Other	4%	4%
	100%	100%

[a] Two largest centres only.

SOURCE: Ontario Ministry of Housing (1976, p. 49).

FIGURE 2.2
IMPLICATIONS FOR LAND USE NEAR URBAN AREAS:
FEDERAL GOVERNMENT PROGRAMS


IMPACT
LAND IMPLICATIONS
PROGRAMS (e.g. C.M.H.C. infrastructure)
• Goals
• Objectives
PROGRAM IMPLEMENTATION
• Process
• Approval criteria (actual)
PROVINCIAL AND MUNICIPAL FINANCIAL AND LAND PLANNING SYSTEMS
INFRASTRUCTURE DEVELOPED
RATE AND LOCATION OF URBAN GROWTH
ALLOCATION OF URBAN USES IN RELATION TO LAND CAPABILITY
CURRENT URBAN AREA CHARACTERISTICS
• Size and growth rate;
• Density of growth;
• Direction and focus of growth;
• Land characteristics (see Figure 2.1).
DENSITY AND FORM OF NEW SETTLEMENT
LOWERING OF PRODUCTIVITY OF NEARBY HIGH CAPABILITY LANDS

Consequently, the land impacts of federal programs, such as CMHC municipal infrastructure assistance, can be expected to vary considerably from province to province and region to region. The level of resourcing, the sophistication, and effectiveness of regional and local planning has also evolved over time and varied from centre to centre and from province to province. These factors create further variation in the nature of land impacts that might be caused by a federal program. Nevertheless, the goals and the structure of the federal program, the conditions attached to project approval under the programs, and the enforcement of these conditions also can affect substantially local land planning.

3. CMHC MUNICIPAL INFRASTRUCTURE ASSISTANCE PROGRAMS: POTENTIALS FOR LAND-USE IMPACTS

Federal infrastructure assistance to municipalities since 1938 is reviewed in this chapter (sections 3.1 and 3.2). The nature and objectives of the three CMHC programs 1961 to 1980 are described in turn (3.3). While these analyses are based on a literature review and interviews with CMHC headquarters personnel, interpretations and conclusions regarding the potential for land-use impacts have been derived by the authors. The potential of these programs for impacts on land are discussed below in relation to:

1) the types of projects funded (3.4);
2) the availability of funding and the criteria and provisions for funding in the programs (3.5);
3) local land-use planning (3.6); and
4) program reviews (3.7).

The land-use impacts of the programs, both initial findings and conclusions as determined through this literature review, are then summarized (3.8).

3.1 Early History of Federal Infrastructure Assistance

Federal involvement in municipal infrastructure assistance began in 1938 with the Municipal Improvements Assistance Act (Parlour and Keilhofer, 1973). Loans under this act were made from 1938 to 1940, primarily to alleviate unemployment through sewage and water system improvement projects. According to Parlour and Kielhofer, this was "...the forerunner of numerous government attempts to alleviate unemployment through the enactment of make-work legislation" (1973, p. 5). The Municipal Development and Loan Act, in effect from 1963 to 1966, was also designed to increase employment through capital works construction, in this case, sewage and transportation systems. Through the Special Areas Program, the Department of Regional Economic Expansion (DREE), established in 1969, also became involved in municipal infrastructure assistance to create employment and attract industry to designated areas of the country (Parlour and Keilhofer, 1973).

The general uses of municipal infrastructure assistance by the federal government, therefore, have been to generate employment and economic growth and to encourage water pollution abatement through capital-intensive sewage and water works. It was within this climate that the CMHC Sewage Treatment Program was initiated in 1960-1961 as an amendment to the National Housing Act, 1953 (Canada, 1970b).

3.2 The Beginnings of CMHC Involvement

As the economy and population of Canada grew in the post-war boom, CMHC became a major supplier of loans for residential housing in growing suburban areas, under the National Housing Act, 1953, (Seaden, 1970, Vol. 2). Due to a lack of municipal finances and land use planning, many of these new subdivisions made use of septic systems for sewage disposal. A 1956 survey by CMHC established that groundwater and even some domestic water supplies often became polluted as a result. Consequently, municipalities began to ask for financial assistance for installation of sewage infrastructure (CMHC, 1979a).

In 1957-1958, the country was in a brief period of economic recession and proposals were put forward for a new municipal

infrastructure assistance program, primarily to alleviate unemployment (Seaden, 1970, Vol. 2; Parlour and Keilhofer, 1973). By 1960-1961, however, when the CMHC's Sewage Treatment Program was initiated, the Canadian economy was on the upswing and unemployment was no longer as serious. As a consequence, the federal government thought it necessary to assist municipalities in only one area of public works expenditure- sewage collection and treatment to provide pollution control (Seaden, 1970, Vol. 2). Nevertheless, only after the legislation came into effect was it realized that the primary purpose of this CMHC program should be pollution control, rather than economic stimulation (Hansard, June 9, 1964).

3.3 Nature and Objectives of the Infrastructure Programs

The three municipal infrastructure programs described below are compared in Table 3.1, in terms of objectives, eligible and ineligible projects, and funding provisions.

1) Sewage Treatment Program, 1961 to 1974

The primary objective of the Sewage Treatment Program (STP), as referred to in Part VI(B) of the National Housing Act, 1953 (Canada, 1970b), was pollution abatement. This was to be achieved through loans and loan forgiveness grants for the construction of sewage collection and treatment systems.

Certainly the objective of water pollution abatement, if achieved, has beneficial impacts on land by improving ground and stream water quality. Some doubts, however, have been expressed about the effectiveness of the STP in this regard, due to the lack of technical competence in this area in most municipalities (Laitman, Reynolds, and Tate, 1971, p. 11):

> "Indeed, in many areas where supposedly remedial measures have been taken under the CMHC program, the water quality has steadily deteriorated, despite the expenditure of millions of dollars."

On the other hand, the generation of substantial employment through large scale construction activity and land development, in the absence of effective land use controls, may potentially affect extensive amounts of land (much of it composed of good agricultural and other resource lands) as well as seriously disrupt the resource productivity of adjacent land. During the period of rapid urban growth, the 1960s and early 1970s, the objective of assisting/encouraging comprehensive urban and regional land planning by the provinces was most notable by its absence in the Sewage Treatment Program.

2) Municipal Infrastructure Program, 1975 to 1978

Under the Municipal Infrastructure Program, the range of grants was expanded and further types of projects were made eligible (see sections 3.4 and 3.5). Pollution abatement remained the primary objective of the program, but a second objective was introduced- encouragement of "... comprehensive land management and residential development in previously undeveloped areas...." (CMHC, 1979a, p. 11), a goal with explicit and significant potential impacts for the land resource. The concept of comprehensive land management though was apparently defined rather narrowly, referring only to the opening up of new land for development, not the full spectrum, including redevelopment, revitalization, and infilling of existing areas. No reference was made in these objectives either to the management or preservation of high quality undeveloped lands

in proximity to urban areas, which were most often already in agricultural or other productive uses.

3) Community Services Contribution Program, 1979 and 1980

Under the 1979 National Housing Act revision, the Municipal Infrastructure Program, as well as the Neighbourhood Improvement Program and Municipal Incentives Grant Program were discontinued and effectively combined under the Community Services Contribution Program (CSCP). Funds under this program were block granted to provincially-approved municipal development in sewage and water infrastructure and a range of other community services (CMHC, 1979b). CMHC sought in this way to maintain a national perspective on what was important for community development, while increasing provincial and municipal control over specific development programs so that local development strategies could be better adapted to local conditions. The objectives of the CSCP for infrastructure assistance apparently remained the same as those under the MIP, despite the substantial structural differences in delivery. Funding for the program ceased in 1980, although other federal money for water pollution abatement remained available, through for example under the Great Lakes water pollution abatement agreement with the US.

3.4 Potential Impacts Through Project Type Criteria

The criteria for eligibility of projects for CMHC loans and grants may have had land-use impacts, through several mechanisms:

1) the tendency for infrastructure funding to support primarily new development as opposed to retrofit for revitalization or redevelopment in already existing areas; this tendency was caused largely by the eligibility criteria- only new areas were eligible for assistance for water supply and storm water systems;

2) influences on the pattern and nature of urban development; and

3) the lack of encouragement for external research into alternative sanitary sewer technology, although CMHC itself did finance such research after 1975 under the MIP.

1) New Development Versus Infill/Retrofit

The STP funded the construction or expansion of sewage treatment plants and sanitary trunk collector sewers (Table 3.1). No funding, however, was provided for internal sewers (i.e., sanitary sewers along local streets and internal to a residential development), any storm trunk sewers, the repair or maintenance of existing sewage systems, or water supply projects. Municipalities were thus encouraged to emphasize trunk collector sewers and sewage treatment plants in their municipal development projects. Parlour and Keilhofer (1973, p. 80) have noted that about 60% of all monies spent under the STP (until 1972) were accounted for by trunk collector sewers as opposed to sewage treatment plants. This approach to infrastructural spending therefore may have merely transferred, rather than reduced, the pollution problem while tending to spread new development over larger areas of land.

Under the MIP, storm trunk sewers and water supply projects for new areas only were made eligible for assistance to encourage a rather narrowly-defined concept of "comprehensive land-use management," that is the development of new lands through the financing of a wider range of infrastructure projects for residential development. These new types of projects were additional to those projects already eligible under the STP, i.e. sewage treatment plants and trunk collector sewers in both new and existing areas.

TABLE 3.1:

COMPARISON OF THE THREE MUNICIPAL INFRASTRUCTURE PROGRAMS

Sewage Treatment Program, 1961-1974	Municipal Infrastructure Program, 1975-1978	Community Services Contribution Program, 1979 and 1980
Objectives 1) Job creation. 2) Water pollution abatement.	Objectives 1) Water pollution abatement. 2) Encouragement of "... comprehensive land management and residential development in previously undeveloped areas."	Objectives 1) Water pollution abatement. 2) Increased provincial and municipal control over specific development programs. 3) Inter-provincial equity. 4) Greater flexibility.
Eligible Projects Construction or expansion of: 1) Sewage treatment plants in new and existing areas; 2) Sanitary trunk collector sewers in both new and existing areas.	Eligible Projects Construction or expansion of: 1) Sewage treatment plans in new and existing areas; 2) Sanitary trunk collector sewers in new and existing areas; 3) Storm sewers in previously undeveloped areas; 4) Water supply in previously undeveloped areas; 5) Development of regional sewerage and water plans.	Eligible Projects 1) Sewage trunk lines and treatment in new and existing areas. 2) Community water supply facilities for new and existing areas (trucked, as well as piped, water supplies). 3) Trunk storm sewer systems (holding tanks and any treatment facilities required) in new and existing areas. 4) Sewer and water site services provided for residential land development conforming to specified density criteria. 5) Any other capital work in the federal-provincial operating agreements. (e.g. in Newfoundland and Nova Scotia- solid waste disposal; and in Manitoba, Saskatchewan, and British Columbia- waste from energy facilities.
Ineligible Projects Internal sanitary sewers; Storm trunk sewers; Repair and maintenance of existing sewerage systems; Water supply projects.	Ineligible Projects Internal sanitary sewers; Repair/maintenance of existing systems; Water and storm sewer projects within existing urban areas.	Ineligible Projects "Works not cited in federal, provincial operating agreements."
Funding Assistance Loans to municipalities covering two-thirds of the eligible capital cost of the projects at interest rates only 1/8% more than the borrowing rate of the Federal Government (usually 1-2% below market rate). Incentive grants equal to 25% of the loan amount would be forgiven under most conditions.	Funding Assistance Loans to municipalities covering two-thirds of the eligible cost of projects with 25% loan forgiveness as in STP. Grants equal to one-sixth of the project cost (if financing was obtained elsewhere). High cost grants (if project costs exceed $250 per capita) for communities of small size or on difficult terrain. Funds covering 50% of the cost for regional sewerage/water plans under most circumstances.	Funding Assistance Grants to provinces under agreements as federal contribution to provincially-approved municipal development in sewage and water infrastructure, as well as other community services.

The potential for truly comprehensive land planning and management, however, was diminished by the restriction of funding for water and storm sewer projects only to new areas of land. With the clear emphasis on opening up new areas for development, the potential was raised for increasing urban settlement impacts on surrounding rural lands.

CMHC also expanded assistance under the MIP to encourage the development of regional sewerage/water plans. Although these plans were not specifically intended to induce comprehensive land management (CMHC, 1979a), they had the potential to encourage development of comprehensive regional land plans, which would consider the location of urban development in relation to the capability of the land resource.

Under the CSCP, storm sewers and water supply projects in existing areas also became eligible for assistance, along with sanitary sewerage projects. This eligibility of all types of sewage and water projects in new and existing areas, including community assistance projects, had the potential to induce more compact urban development and assist in the revitalization of existing neighbourhoods. The potential also existed to link the development of sewage and water infrastructure with other urban revitalization schemes in a program of integrated municipal development.

Partly because of the momentum of the MIP, however, over 55% of the $400 million total assistance under the CSCP ($221 million) was allocated by the provinces to sewerage and water projects (Cross, 1981). In proposals for CMHC funding, the provinces were free to choose sewage and water projects over other kinds of community services and could also elect to develop infrastructure projects in new rather than existing areas. While two years is a relatively short time to clear up the backlog of projects under the MIP and to develop new initiatives, the provinces and municipalities appear not to have responded to the option of funding for alternative forms of development.

2) Pattern/Nature of Growth

The staging and location of sewage infrastructure development can be utilized to direct and phase urban development in a compact form, contiguous to the present urban area. By their nature, sewerage and other piped services encourage more compact development than individual septic tank systems. If, however, appropriate provincial and local land-use plans and regulations were not in place to prevent it, CMHC infrastructure funding may have encouraged urban development (and rural to urban land conversion) along corridors into the country-side, following CMHC financed trunk sewers, or in a scattered, 'leap-frog' pattern in anticipation of trunk service extensions. Such development could result in the further consumption of high capability agricultural land and a lowering of the productivity of rural land adjacent to the pockets or strips of urban development.

3) Research

It has been suggested that the lack of incentives for research and development of new sewage disposal technology was a serious deficiency of the STP (Seaden, 1970, Vol. 3). This may have been its most important implication for the land resource. In pursuit of the dual objectives of pollution abatement and job creation, almost all funded projects were comprised of conventional sewage technology characterized by sewage collection

over a wide area and treatment at a central plant.

Emplacement of such conventional systems requires deep, well-drained soil, typical of the high quality farmland in proximity to many of Canada's largest urban areas. Shimizu et al. (1975) have observed that little encouragement was given for the development of sewage collection systems with proven feasibility for areas of shallow, poorer soils (i.e., generally poor quality agricultural or forest land). Such incentives for technical research might have provided earlier development and acceptance of much cheaper source-recycling systems, such as humus toilets or CMHC's Canwel Wastewater Treatment System (described below). While development and use of the recycling approach alone would not have generated as much employment in the construction industry, it might have dealt effectively with pollution abatement for certain neighbourhoods or areas.

In contrast to the Sewage Treatment Program, under the MIP, CMHC (together with Environment Canada and the National Research Council) provided a major thrust in research for the improvement of infrastructure technology (CMHC, 1979a). This research has resulted in the development of the Canwel Wastewater Treatment System to recycle waste and wastewater (CMHC, 1979a). This prototype system has been tested in an individual apartment building unit and a small residential neighbourhood. If proved and applied widely, the system potentially eliminates the need for total reliance on capital-intensive and development-directing conventional sewage and water infrastructure systems. The development of the Canwel system continued after the termination of the Municipal Infrastructure Program in 1978, but CMHC has not as yet been able to create commercial acceptance for the system (Kochar, 1984).

While the widespread use of the Canwel or similar systems might shift employment from the construction to the manufacturing sector with overall reduced levels, poorer quality land could be used for urban (i.e. residential) development, since deep soils would not be required for the laying of trunk sewers under this system. As a consequence, there would be potential to reserve high quality land for more appropriate resource uses. On the other hand, footloose sewage treatment technologies, whether septic tanks or recycling, allow development without regard to considerations of urban form.

3.5 Potential Impacts Through Funding: Administration, Availability, and Attractiveness

Under the STP, CMHC provided loans to cover two-thirds of the capital costs of eligible projects at interest rates only one-eighth percent greater than the borrowing rate available to the federal government and well below market rates (Seaden, 1970, Vol. 2). As well, CMHC offered incentive grants equal to 25% of the loan amount; these were forgiven if project applications met certain deadlines. The original deadline of March 31, 1963 was amended several times to a final date of March 31, 1974. Seaden (1970, Vol. 2) has calculated that, during the 1960s, municipalities could borrow from CMHC under this program at an effective rate of 4%. Parlor and Kielhoffer (1973) note that these funding arrangements were intended to, and indeed did, make the STP more attractive than other municipal aid programs.

Under the Municipal Infrastructure Program, funding continued to include loans to cover two-thirds of the costs of projects at favourable interest rates with 25% loan forgiveness if application deadlines were met. If the borrower obtained financing elsewhere (usually at a lower rate), CMHC still provided a grant equal to one-sixth of the project cost. In addition, high cost grants were extended if project costs exceeded $250 per capita. This provision was aimed at aiding small, low-density communities or those on difficult terrain that would not otherwise have been able to afford services under the STP (CMHC, 1979a). Small communities were also allowed to designate a certain proportion (from 10 to 50%) of the entire project excepting building connections as eligible for assistance. In addition, CMHC funded 50% of the cost of preparing regional sewerage/water plans (CMHC, 1979a).

CSCP block funding through grants to provinces (described briefly in section 2.3 above) was determined through a population and income formula. By this, CMHC sought to ensure more equitable distribution of funds to all provinces. By reducing the inequitably high proportion of funds received by wealthy and faster growing provinces, where some of the best agricultural land occurs, the potential negative land impacts of CMHC programs might also be reduced somewhat.

The ease of availability and attractiveness of the CMHC loans and grants may have had land-use impacts through a number of mechanisms, as described below. These included:

1) the tendency to be demand-responsive, with increasingly less central control over the programs;

2) application deadlines for the forgiveness grant portion of the loans which may have hurried applying municipalities and therefore hindered their ability to plan properly;

3) the very attractiveness of funding; and

4) the free ride for servicing that municipally-paid infrastructure installation could give to industries moving to suburban areas.

1) Administration

Unlike programs under the earlier Municipal Improvements Assistance Act of 1938 and the New Municipal Development and Loan Board Act of 1963, funding allocations under the STP and the MIP were not based on population ratios, neither municipal nor provincial to national (Parlor and Kielhoffer, 1973). Nor were any other national indicators used, such as fiscal and/or borrowing capacity or pollution levels. From the latter portion of the STP (1969) until 1978, provinces were able to decide how much assistance they required through joint federal-provincial committees (Kochar, 1981). If annual allocations to a province were exceeded, projects were simply moved over to the following fiscal year; that is, the supply of CMHC funding continued to be dictated almost totally by demand. If CMHC regional offices established that provincial applications were in order, national office made the money available (Parlor and Kielhoffer, 1973). Thus, CMHC operated these programs with little control over priorizing of national or provincial needs, the scale and direction of municipal infrastructure development, final project costs, and ultimately subsequent urban development and settlement patterns facilitated by the provision of serviced land (Seaden, 1970, Vol. 2; CMHC, 1971; Parlor and Kielhoffer, 1973).

As a consequence, large populous municipalities and provinces obtained a higher

proportion of CMHC infrastructure funding than their populations, growth, or pollution problems warranted, largely because they were more wealthy, better organized for loan/grant applications, and more aware of pollution problems and of the CMHC programs (Seaden, 1970, Vol. 2). Since borrowers had to provide some funding of their own, the lower fiscal and borrowing capacity of "have not" municipalities and provinces diminished their ability to raise these funds. Similarly, these smaller or have-not provinces and municipalities often had neither the staff nor the organizational capacity to take full advantage of CMHC grants and loans.

About 62% of the total value of CMHC funding (until 1970) went to the 20 largest urban areas, the Census Metropolitan Areas, which in 1971 accounted for only 48% of Canada's population (Seaden, 1970, Vol. 2). Yet, as previously stated, the work of Manning and McCuaig (1977) and Neimanis (1979) indicates that most major urban centres in Canada are surrounded by high capability agricultural land. Provision of greater levels of infrastructure assistance to these larger centres therefore may have tended to increase the rural to urban land conversion and disruption of higher quantities of agricultural land than otherwise would have occurred.

The intention to provide greater assistance to small communities (through high-cost grants) was frustrated by CMHC's lack of control over project definition and final project costs (Kochar, 1981). Large, wealthy, and fast-growing municipalities sometimes applied for and received the high cost grants designed for smaller centres on difficult terrain. This was done simply by using excessive project standards, which raised costs above the $250 per capita limit (CMHC, 1979a). By allowing these larger municipalities on less difficult terrain to take advantage of lower cost funds, not only was this program objective potentially undermined, but to the extent that infrastructure directs development, the potential for the loss or disruption of high capability land resources was increased. More land may have been consumed and agricultural productivity affected over wider areas than if infrastructure funding had been re-distributed to smaller, communities (potentially on lower quality land, i.e. on shallow soils in difficult terrain), as was originally intended.

In contrast to the earlier programs, CMHC sought under the CSCP to ensure more equitable distribution of funds to all provinces through a population and income formula for funding.

2) Funding Deadlines

The association of loan forgiveness with project application deadlines was intended to speed employment creation (Seaden, 1970, Vol. 2) and to remove roadblocks to urban development (Kochar, 1981). At the same time, these deadlines, which were extended several times, may have discouraged in-depth project planning and assessment of potential land impacts by the municipalities. Under tight, short-term funding deadlines, local planning could well become secondary to financial considerations for the municipality and, therefore, have increased the likelihood of poorly co-ordinated planning. As a result, urban development may have encompassed unnecessarily more land or been located on higher capability land when lower quality areas were available nearby.

3) Availability and Attractiveness of Funding

The availability and attractiveness of infrastructure assistance funds to municipalities had the potential for significant effects on the land resource, for both good and ill. Borrowers may have been encouraged to propose large, capital-intensive projects to take advantage of cheap and almost sure money and economies of scale.

This emphasis on capital intensity may have favoured the over-design of projects so that land would be serviced by the cities beyond reasonable projections of economic and demographic growth. Local authorities might also wish to build on serviced land quickly in order to amortize their capital debt. Hence, a potential incentive of these programs was for municipalities to use more serviced land per development and for each municipality to strive for growth.

Funding under the MIP was considerably more attractive than under the STP. Since the number of eligible projects was greatly expanded, even larger, capital-intensive projects were encouraged as municipalities sought to take advantage of the cheap funding and economies of scale. The combination of emphasis on opening up new land for development, continued lack of funding for water supply and trunk storm projects in already developed areas (for retrofit, infilling, and renewal), and the effectiveness of the financial assistance meant that the MIP continued to provide a strong encouragement for urban expansion onto rural lands. Although serviced land might tend to encourage expansion to be more compact and contiguous, the form and density were quite likely to

water supply and trunk storm projects in already developed areas (for retrofit, infilling, and renewal), and the effectiveness of the financial assistance meant that the MIP continued to provide a strong encouragement for urban expansion onto rural lands. Although serviced land might tend to encourage expansion to be more compact and contiguous, the form and density were quite likely to depend on the presence and nature of local planning controls.

4) Suburbanization of Industry

Seaden has estimated that industrial effluents represent 25% to 50% of the total municipal sewage flow; the low cost of sewage funding under CMHC municipal infrastructure assistance may have largely "...exonerated industrial users...from paying economic user charges" (Seaden, 1970, Vol. 2, p. 16). By using some of these dollars to provide inexpensive industrial waste collection and treatment, municipalities and the provinces at least partially subsidized industry in suburban developments and therefore served to attract it there. This very strategy was also used by the Department of Regional Economic Expansion to draw industry to economically weak areas of Canada (Parlor and Kielhoffer, 1973). The widespread relocation of "space-consuming" industries to the suburban areas of Canada's large urban centres may have been at least partly induced by the servicing of large areas of new industrial land under these infrastructure assistance programs.

3.6 Potential Impacts Through the Lack of Enforced Land-Use Planning Criteria

The potential for land-use planning in aid of conservation of productive resource land was inherent in the STP. Provision of piped services funded by the STP was not accompanied by significant encouragement for infill and revitalization of existing areas. Together

with the trend to smaller urban lot sizes and frontages for single-family dwelling, this may have induced a more compact residential development form, compared to areas serviced by septic systems (with their requirement for larger lots). While theoretically, project approval criteria under the STP required consideration of the land resource and local land planning controls, the lack of implementation of these criteria may have tended to negate this potential land-use benefit of the program. This was apparently the result of sensitivity on the part of the provinces of this perceived infringement of provincial responsibilities (Kochar, 1984). To some extent, CMHC inspection of subdivisions for mortgage insurance approval provided an opportunity for land planning review by the agency. In some areas, the Corporation was a dominant force in the mortgage insurance field, at least in the earlier part of the period. Therefore, these concerns were partially, if not systematically, addressed.

Applications for funding under the STP could be submitted by the provinces, by engineering firms on behalf of municipalities, or by the municipalities themselves. According to the program guidelines, CMHC attached certain conditions to the payment of loans, such as evidence of a land-use plan. In practice, however, it acted primarily as a banker (Seaden, 1970, Vol. 2; Parlour and Keilhofer, 1973; Shimizu, 1975). The borrower generally was required to submit only financial and technical engineering documents, which had provincial approval (White, 1981). Land-use plans were seldom forwarded; nor were they reviewed rigorously by the Corporation.

With the lack of real requirements or encouragement for proper land planning through the STP, CMHC relied on provincial and municipal initiatives in this area. Many provinces had only implemented steps towards comprehensive land planning during the early seventies, after the STP program was largely completed. Thus the STP operated, in many instances, in a land-use planning vacuum. Moreover, because it operated primarily as a lending institution, CMHC was unable, not interested, or lacked the mandate to conduct a proper evaluation of the STP vis-à-vis its implications for the allocation, regulation, and use of high capability resource lands (Seaden, 1970, Vol. 2).

Regulation under the MIP was similar to that under the STP. Applications for assistance could be submitted by municipalities or by provinces or firms on their behalf. The primary criteria for acceptance were provincially-approved financial and technical documents. While land-use planning criteria existed (e.g. evidence of an official land-use plan), they were not strictly enforced by CMHC (Kochar, 1981), nor were these municipal plans required for final provincial approval of infrastructure development.

CMHC took some initiative for land planning under the MIP by providing 50% funding for regional sewage and water plans, usually with a land-use component. Over three and one-half million dollars were provided for 80 regional plans, about 0.2% of total CMHC commitments under the MIP (CMHC, 1979a).

Overall though, considering that the need for land-use planning had been recognized in reviews of the STP, the land-use planning process was clearly not emphasized in the MIP (Seaden, 1970; CMHC, 1979a). As it stood, the program funded projects with potentially

serious land impacts, but municipalities and provinces received no encouragement from the program to plan urban development that was sensitive to the local land-resource capability.

CMHC's rationale for this lack of attention to land-use planning issues, and not without some justification, was that land use was under provincial jurisdiction. Therefore, only limited regulation or encouragement could be provided for better land-use planning. As well, it was felt that municipalities had serious existing pollution and development problems in the face of the huge demand for affordable housing, which superceded the potential negative land impacts of the MIP (Kochar, 1981). Thus, potentially significant land-use impacts were perhaps overlooked in a program which was designed simultaneously to alleviate pollution, promote residential development, and create employment.

Administration of CMHC infrastructure programs gradually became decentralized from the national office to regional and local CMHC offices and to the provinces. CMHC project approvals under the STP were originally made at the national office. To ease the growing burden of applications in the latter part of the STP (after about 1970), project approvals were handled at the regional and local offices of CMHC; at this point, the national office still approved financial commitments (Parlour and Keilhofer, 1973). Towards the end of 1974, as the MIP came into effect, continued growth of the program and growing local and provincial concerns brought about a further decentralization of program administration (CMHC, 1979a). First, regional offices were given budgetary control for projects, while the national office was responsible for the allocation of funds to regions. Secondly, in joint committees with CMHC and Environment Canada, each of the provinces were able to priorize projects and project types on which annual CMHC funding allocations under the MIP were based (Kochar, 1981).

This delegation of control to CMHC regional offices had the potential to introduce a local/regional land planning perspective into the infrastructure program. Increased provincial control through joint committees also had the potential to increase the provinces' land management input. The provincial screening process for CMHC infrastructure project applications, however, was primarily technical and financial (Kochar, 1981). Moreover, this overall decentralization process tended to remove the opportunity for a national perspective on the land-use impacts of this program.

In the early 1970s, it was recognized that this CMHC program affected the jurisdictions of other federal departments. As a consequence, an interdepartmental committee was established to increase liaison and discussion on the effects of the infrastructure program (CMHC, 1979a). The committee included Environment Canada, Ministry of State for Urban Affairs (now disbanded), Department of Finance, Treasury Board, and the former Department of Regional Economic Expansion. By this time, however, the infrastructure programs had a momentum of their own with established procedures and strong links to other government levels. As a result, it would have been difficult for this committee to modify the overall environmental or specific land-use impacts of the program (Shimizu et al., 1975).

Beyond the indirect inducements for reducing the potential land impacts, no specific land-use criteria were attached to any of the CSCP allocation agreements between CMHC and the provinces (Cross, 1981). Each of the provinces had a variety of land-planning criteria of varying degrees of rigour for assessing projects proposed by their municipalities.

3.7 Program Reviews and Land-Use Impacts

In order to plan the CMHC infrastructure program for the seventies, George Seaden headed a Task Force in 1970 to review the objectives, achievements, and mistakes of the Sewage Treatment Program (Seaden, 1970). In reality, the full land-use effects of the STP were then yet to be felt. Seaden did not directly analyse the land impacts of the program (Table 3.2), but rather referred ocassionally to its land implications and to urban sprawl (e.g. Vol. 3 and 6). The foregoing analysis of potential land impacts, however, is linked directly to his major criticisms of the STP. Of this first part of the CMHC infrastructure program, Seaden (1970, Vol. 1, p. 14) says:

> Its history over the past decade shows problems arising from a loose definition of objectives, counter-redistributive effects, capital intensive project bias, a lack of incentive for technical and economic innovation and a possible indirect subsidization of industries on a selective basis.

As has been seen, the potential land implications of each of these problems are considerable.

CMHC's Land and Infrastructure Division (1971) and Parlour and Keilhofer (1973) have criticized the failure of the Sewage Treatment Program to positively affect "... the form and scale of urban development." Considering the emphasis of expenditures on trunk sewers to that time, Parlour and Keilhofer (1973) questioned the lack of a significant focus on the study of environmental (including land-use) impacts. Shimizu et al's. (1975) analysis of the legislative and administrative aspects of the STP also emphasized the lack of an overall environmental policy rationale for the program.

A review of the STP, conducted by a high-level interdepartmental committee established by the Federal Cabinet in 1971, made recommendations forming the basis of amendments to the National Housing Act, 1970 (Canada, 1970b), regarding the establishment and implementation of the Municipal Infrastructure Program (CMHC, 1979a). The CMHC (1979a) final program review made little mention of the actual findings of the committee (which remain restricted), concentrating instead on its recommendations, one of which referred to 'comprehensive land management' (Table 3.3).

Thus, while it is evident that some of the land-use impacts of the STP were recognized before the introduction of the subsequent and much larger Municipal Infrastructure Program in 1975, no substantial analysis of the land implications of these programs was ever made.

3.8 Initial Findings: A Summary

In this section, the findings obtained and conclusions reached on the basis of the literature review and interviews with CMHC officials are recapitulated. These findings

TABLE 3.2:

CONCLUSIONS AND RECOMMENDATIONS: SEWAGE TREATMENT PROGRAM REVIEW

1) The threat to national survival from indiscriminate and uncontrolled waste disposal is of national importance and is, therefore, of concern to the Federal Government.

2) The Federal Government should provide leadership in solving the problems of urban environment, including financial help, if necessary.

3) Without increased expenditure in the area of municipal sewage disposal, no significant environmental improvement is possible, and in order to bring about efficient investment of public funds, control and monitoring measures will have to be implemented.

4) The Federal policy for funding municipal sewage disposal projects should incorporate the existing legislative and institutional arrangements.

5) The Federal policy for funding municipal sewage disposal projects should recognize the multi- objective nature of the problem.

6) The Federal policy for funding municipal sewage disposal projects should contain provisions for proper cost/effectiveness evaluation.

7) The Federal policy for funding municipal sewage disposal projects should be conditional on the operation of facilities being properly monitored and carried out by skilled personnel.

8) The Federal policy for funding municipal sewage disposal projects should incorporate contingency provisions.

9) The Federal policy for funding municipal sewage disposal projects should consist of a broad loan fund in association with conditional grant fund(s).

10) The Federal policy for funding municipal sewage disposal projects should contain an allocative process governed by either a complex set of regulations, or by a continuous evaluation process.

11) Part VI(B) of the National Housing Act should be allowed to terminate in its present form by 1975 and the activity under this legislation should be phased out.

    A new effective Federal policy for funding municipal sewage disposal projects should be introduced.

12) The Federal policy for funding municipal sewage disposal projects should be considered within the context of a comprehensive national urban policy.

Source: Seaden (1970), Vol. 1 as reported in CMHC, 1979a.

TABLE 3.3:

INTERDEPARTMENTAL COMMITTEE POLICY OPTIONS AND RECOMMENDATIONS

Policy Options

1) A level of assistance to achieve a basic standard of treatment across Canada.

2) Assistance to achieve a basic standard plus assistance for upgrading of treatment facilities.

3) Use of sewage treatment assistance as a strategic tool for residential land development.

4) Full range of Federal sewage treatment assistance measures.

Recommendations

1) The committee recommended that a statement of program objectives be included in the legislation.

2) Members of the Committee believed that definite targets should be set for the Program, and that these, together with a plan of action to achieve them, should be embodied in a series of agreements with the provinces, setting out the maximum allocation of Federal funds available to each province for its plan of action. These arrangements would include program termination dates, possibly ranging from 1978 to 1985, depending on the province involved.

3) Although the Committee recognized that sewage collection and treatment was only a part of the total water/sewer package, they recommended that the scope of the program be limited to assistance for sewage treatment facilities in the form of trunks of all sizes and treatment plants. It was recommended in this regard that the current restrictions on trunk size as they applied to smaller communities be relaxed as local circumstances indicate.

4) The Committee recommended that the basic level of capital assistance under the program be retained at 66 2/3% of project costs.

5) The Committee recommended that the current level of forgiveness be retained as the "basic" level of support for achievement of Federal objectives.

6) To provide greater assistance to smaller and slow growth centres, Members of the Committee recommended the provision of further Federal capital and forgiveness to the extent necessary to hold per household carrying charges in smaller centres to some agreed ceiling along the lines of programs employed in Alberta, Ontario, Nova Scotia and British Columbia. This would have the effect of aiding declining or stable centres in the Prairies, Quebec, and the Maritimes, and centres in the North. Additional capital requirements would be small. Members of the Committee recommended that where a provincial program of assistance along these lines was currently in effect using equivalent terms and conditions to the Federal program, the additional Federal assistance be made available to the province. A detailed design for this feature was to be developed and its full financial implications calculated.

7) The Committee recommended a provision that where a municipality obtained funds elsewhere for a sewerage project which would have been eligible and acceptable under the NHA, the forgiveness may be made in the form of a grant as if a loan had been made by CMHC.

8) Members of the Committee recommended that technological equivalents to conventional methods of treatment be eligible for capital financing under the new program.

Source: CMHC, 1979a.

are very briefly listed below- first those to be further investigated and then those for which no further inquiry is possible in the context of this research.

1) New Development Versus Infill/Retrofit- The CMHC municipal infrastructure programs, especially the MIP, tended to encourage the urban development of new land rather than more intensive use (infill) or redevelopment of established areas or the provision of new or renewed services to these existing areas (retrofit).

2) Pattern/Nature of Growth- The staging and location of sewage infrastructure development can be utilized to direct and phase urban development in a compact form, contiguous to the present urban area. If, however, appropriate provincial and local land-use controls were not in place to prevent it, CMHC infrastructure funding may have encouraged urban development along corridors into the country-side, following CMHC-financed trunk sewers, or in a scattered 'leap-frog' pattern in anticipation of trunk service extensions.

3) Administration (Funding)- Lack of central control may have resulted in the uncontrolled distribution of funds primarily to larger and faster-growing communities (i.e., demand-responsive funding), surrounded by higher capability agricultural land.

4) Funding Deadlines- Short-term deadlines reduced the time for and thereby the opportunity for land planning.

5) Availability and Attractiveness of Funding- The ease of availability and attractiveness of CMHC funding may have encouraged larger, more capital-intensive projects than required on the basis of economic and demographic growth potentials and therefore the consumption of more rural land around many urban centres.

The following two conclusions are presumed to have been adequately investigated at this point or are unable to be further investigated in this research.

1) Lack of Enforced Land-Use Planning Criteria- While the requirement for the municipality to have an official land-use plan was among project approval criteria, in practice it was largely overlooked by CMHC, due to sensitivity to infringement of provincial responsibilities.

2) Research- The Canwel system had potential for revolutionizing sewage infrastructure requirements. It is unclear, however, that the greater freedom of location of a "foot-loose" system, such as Canwel, would have beneficial land-use effects. Indeed, without local land-use controls, the flexibility of the Canwel system would facilitate the scatteration of settlement throughout the countryside. Nor is there indication that CMHC could be successful in promoting widespread use of such a system. It is, of course, impossible to estimate the potential land-use impacts of other systems-systems which do not yet exist (due to lack of investment). No further analysis of this conclusion is possible in the context of this study.

4. RESEARCH STRATEGY: WHAT? AND HOW?

The essential aim of this research is to determine the presence, extent, nature, and significance of the impact of CMHC's municipal infrastructure assistance programs on urban land use and on the location and nature of urban growth in Canada. The logical framework utilized in analyzing the potential land-use impacts (intended or not) of CMHC infrastructure funding has been sketched in Figure 4.1. The framework explicity acknowledges that at least two conditions must be present for CMHC infrastructure funding to influence urban development. First CMHC funding must be important to any given infrastructure project (i.e. provide financial leverage). In addition, the assisted project must be important to facilitating and/or influencing the nature and/or extent of urban development (i.e. on-the-ground leverage).

4.1 Hypotheses

Three specific hypotheses have been chosen for investigation of these issues; these are reflected in the three key analyses noted in the logical framework. The hypotheses are briefly outlined below.

1) Hypothesis 1- CMHC Financial Leverage

Both direct and "triggered" (or leveraged) influences are to be investigated to determine the existence of financial leverage by the programs.

a) In the context of municipal capital spending for sewerage and water infrastructure in Canada, CMHC infrastructure funding was sufficient to provide substantial leverage (whether intentional or not) for increased infrastructure development and therefore, increased the potential of the program to significantly affect the nature and pattern of urban development in Canada.

b) Additional provincial and municipal funding above what ordinarily would have been spent on sewerage and water infrastructure was also triggered by these CMHC assistance programs, thus magnifying their leverage in terms of overall infrastructure development.

2) Hypothesis 2- Relationship of CMHC Assistance to Urban Development Characteristics

Three different kinds of relationships are to be investigated:

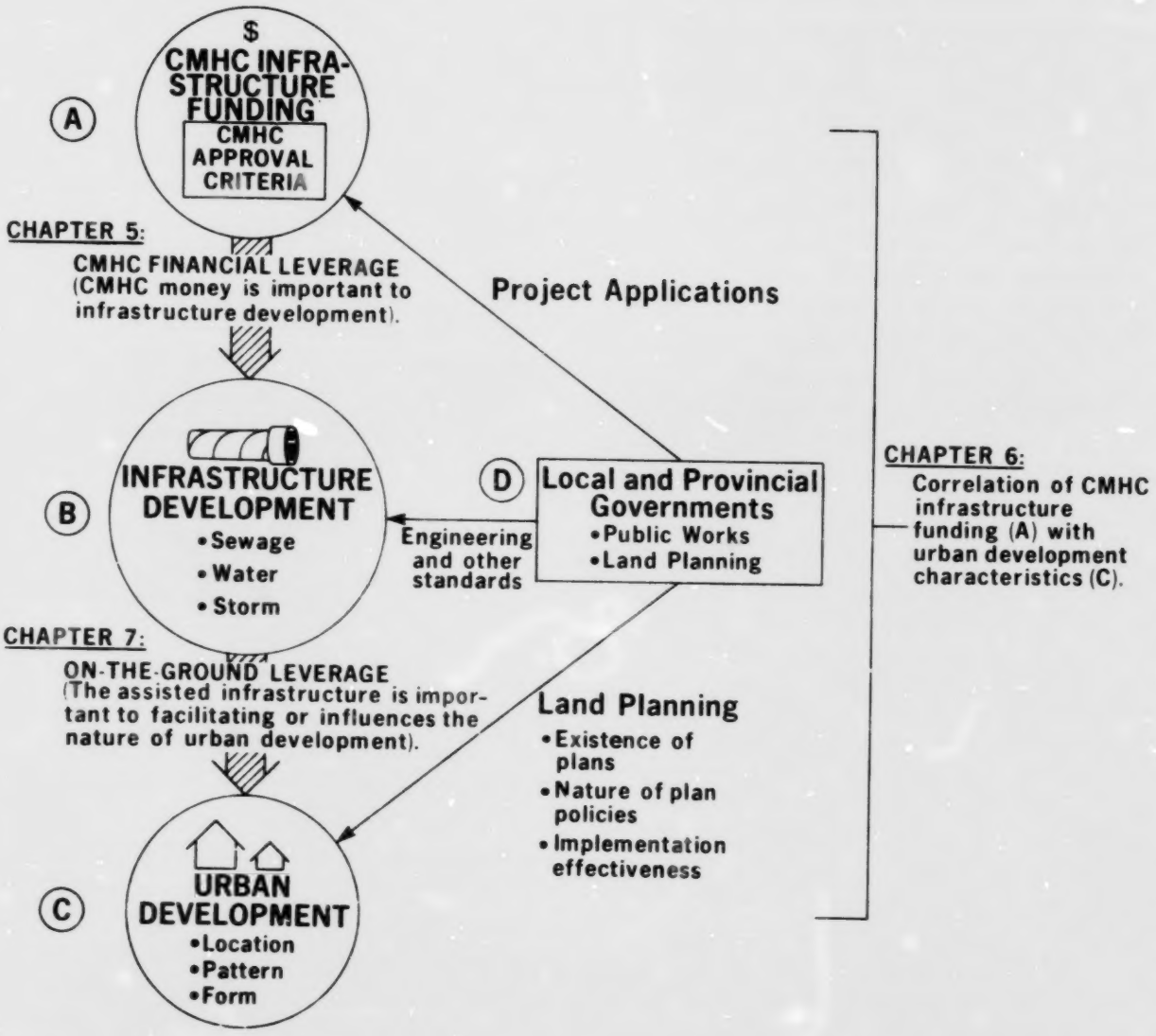
a) By the promotion of large, capital-intensive technologies for water pollution control, CMHC generally had the potential to encourage denser, more contiguous urban development. Nevertheless, it is thought that the infrastructure programs tended to encourage less dense residential development with high levels of land consumption, especially from 1975 to 1978, because the funding focussed primarily on new areas rather than retrofit or infill development in existing areas. Therefore, direct consumption of more rural land for new development was encouraged.

b) CMHC infrastructure funding was generally demand-responsive. It focussed on the servicing of high-growth centres without attempting specifically to direct growth to lower-growth centres (intentionally or unintentionally).

c) The centres which received a high proportion of CMHC infrastructure assistance also tended to be those predominantly surrounded by land in current agricultural use and of higher agricultural capability.

FIGURE 4.1

STUDY FRAMEWORK: LAND IMPACTS BY CMHC INFRASTRUCTURE PROGRAMS



3) Hypothesis 3- On-the-Ground Leverage

The key factors influencing the impact of CMHC-assisted infrastructure on the extent and location of local urban development were the presence, nature, and effectiveness of local land planning.

4.2 Research Approaches

Three different approaches have been adopted for this research. Each corresponds directly to one of the above-described hypotheses. "Financial leverage" was investigated using national and provincial data on infrastructure and funding; the "relationship of CMHC assistance to the development characteristics of cities" was researched by statistical analysis of two linked data sets on CMHC funding and land consumed by urban growth; and the "influence of local planning" was probed by a survey of urban and regional planners. Substantial cross-fertilization of ideas and analyses among these approaches also occurred, but the primary use of information was as described briefly below. More detailed methodological discussions accompany the analyses presented in chapters 5 to 7.

1) CMHC Financial Leverage (Hypothesis #1)

This hypothesis contends that CMHC infrastructure assistance increased spending on municipal infrastructure, including the "triggering" of additional provincial and local funds. The relative level and trends in CMHC loans and subsidies have been compared to total municipal service capital infrastructure expenditures to assist in determining what the potential significance of these programs might have been for urban development in Canada directly and by triggering other (provincial and municipal) funds. This portion of the research consisted of a comparison of CMHC loans to total municipal capital infrastructure spending. Global, temporal, and regional analyses were carried out for the period from 1961 to 1980 (and for the periods before and afterwards). These analyses utilized several basic data sources, primarily Canadian Housing Statistics (CMHC, 1962-1979) for CMHC funding and Local Government Finance (Statistics Canada, 1960-1982a, b) for municipal expenditures. The results of these analyses are presented in Chapter 5.

2) Relationship of CMHC Assistance to the Development of the Land Resource (Hypothesis #2)

The second hypothesis basically suggests that CMHC infrastructure assistance was proportionately greater in the larger and faster-growing centres and those expanding onto better quality agricultural land. This portion of the research utilized statistical analysis of two computer data bases.

The first data base was constructed of a systematically-chosen sample of about one-third (774) of the 2,500 CMHC files at the national office, containing information on projects under the Municipal Infrastructure Program between 1975 and 1978. (An attempt to analyze projects from the earlier STP was also made, but incomplete data prevented use for these purposes.) The data base included province and municipality name; municipal population; the date of project approval; the type of project (e.g. sewage treatment, water supply, etc.); area to be served; design population in new and/or existing developments; and total project cost. Analyses of the distribution of projects and funding by urban area size, region, and regional population were carried out.

These project data were also compared statistically to the second data set containing population size, growth characteristics, and land capability/land use of areas urbanized for Canada's 80 largest urban centres from 1966 to 1976 as prepared by Warren and Rump (1981). (Only 55 centres, represented in the CMHC data set, were included in this analysis.) This data set was developed specifically for this project, but is intended to be expanded upon in the future for other uses.

The key variables analyzed using these two data bases (CMHC project and urban growth characteristics) included the relationship of CMHC infrastructure to:

1) population of centre and land efficiency of growth (density) hypothesis #2a);

2) population growth rate and urban area growth (absolute and percentage; hypothesis #2b); and

3) area and percentage increase in land urbanized which had been in crops or which was of high capability for agriculture (hypothesis #2c).

The nature and results of these analyses are described in Chapter 6.

3) On-the-Ground Leverage (Hypothesis #3)

The degree of impact of CMHC infrastructure assistance on the location and nature of local urban development and, therefore, the importance of local land planning in influencing the land impacts of CMHC assistance, was investigated through an informal sample survey of 22 local and regional planning offices. These interviews were carried out with municipal, county, and regional planners as well as other informed municipal personnel for representative urban centres, urban-centred regions and rural areas all across the country (Table 4.1). The distribution of interviews was stratified based on the distribution of CMHC infrastructure projects, according to city size and province. The table shows that the intention to be reasonably representative was achieved. It was intentional that smaller centres (less than 250,000) and those from the less populous regions be somewhat over-represented.

Planners were contacted to determine their willingness and ability to participate (in terms of access to knowledge of the projects) and an interview was scheduled. Then, the CMHC files for the municipal infrastructure projects at the national office were searched to determine the nature of CMHC assistance in general and in several specific (usually MIP) sewerage and water projects (three to six), which could be discussed in some detail. A tentative list of these projects was finalized with input from the planners. Finally, the telephone interview of about one and one-half hour's duration took place based on the questionnaire (reproduced in Appendix A). An effort was made to establish the overall planning context (nature of urban development, presence of community/area plans, provincial planning role, etc.) and planning issues related to individual CMHC-assisted infrastructure projects (density and contiguity of development, consumption of agricultural land, relationship to flood and other hazard lands, etc.). The best interviews tended to be those in which the planner had consulted extensively with local public works personnel or in which such personnel were actually involved. In only one case was it not possible to have an interview due to lack of co-operation, although in several cases, too few projects or too little CMHC money expended in the area made it impossible to proceed (Stratford, Chicoutimi). In many cases, a review of a partial

TABLE 4.1:

PLANNER SURVEY: POPULATION AND REGIONAL STRATIFICATIONS

	% of MIP Loans ($)	No. of Centres	% of Survey
POPULATION OF URBAN AREA SAMPLE:			
Less than 25,000 or rural	22%	3	14%
25,000-99,999	6%	7	32%
100,000-249,999	7%	5[a]	23%
250,000-499,999	17%	3	14%
1,000,000 or more	47%	4[a]	18%
	$924 M	22[a]	100%
PROVINCE/REGION:			
Atlantic	9%	3	14%
Quebec	43%	8[a]	36%
Ontario	34%	6[a]	27%
Prairies	5%	3	14%
British Columbia	9%	2	9%
	$924 M	22[a]	100%

[a] Four case studies have been combined into one in Montréal; those of Windsor and Essex County have also been considered together in the analyses.

preliminary draft of this report was also undertaken by the interviewees, when the possibility of misinterpretation existed or clarification of the text of a case study was required. The interview analysis is presented in Chapter 7.

5. CMHC FUNDING: THE CASE FOR LEVERAGE

The potential impact of infrastructure provision on the location, form, and pattern of urban development has already been discussed in the literature review (sections 3.4 through 3.6). This chapter tests the first hypothesis that CMHC municipal infrastructure funding had sufficient financial leverage to increase spending on municipal infrastructure in Canada (hypothesis 1a; Figure 5.1). These funds are also hypothesized to have triggered additional provincial and municipal expenditures on such infrastructure (1b).

This chapter outlines and evaluates the potential for leverage of CMHC municipal infrastructure funding in the context of total municipal capital expenditures on sewage, water supply, and storm water infrastructure in Canada over time (5.1), and regionally (5.2).

CMHC funding for infrastructure provision between 1961 and 1980 totalled $2,004 million in loans and $774 million in forgiven loans and grants for high cost projects, non-NHA financed projects, and regional sewerage and water plans, as well as for grants to provinces under the Community Services Contribution Program (CSCP). In 1982 dollars, these figures were $4,215 million and $1,221 million respectively (Table 5.1; adjusted using Statistics Canada's Composite Cost Index for Non-Residential Building Materials and Wage Rates) (CMHC, 1962-1983). These adjusted data form the basis of certain key analyses in this section.

In the period of the Sewage Treatment Program (STP; 1961 to 1974), CMHC loans covered over two-fifths of all the sewerage capital expenditures by municipalities (Table 5.1) and over one-fifth of sewerage and water expenditures together (1965 to 1974 only). CMHC loans also amounted to over one-quarter of sewerage and water expenditures under the Municipal Infrastructure Program (MIP; 1975 to 1978). It should be noted that data for storm water infrastructure expenses on this basis were unavailable and are therefore ommitted, artificially raising the apparent significance of CMHC funding in this table. Partially offsetting this ommission are non-infrastructure expenses- e.g., waste removal, which are included in these expenditures before 1964. In addition to these loans, loan forgiveness and other grants over this period represented an additional direct subsidy of over 5% of sewerage capital expenditures under the STP and about 10% of both sewerage and water expenditures during both the MIP and CSCP. Grants are financially more beneficial to a municipality, because they are a 100% savings for it, and probably represent higher "leverage." The real savings of a loan for a municipality was the subsidy of a below-market interest rate over time. The principal still had to be repaid (albeit at a discounted value due to inflation) and still had to be considered in assessing a municipality's credit rating.

5.1 Analysis of Financial Leverage: Temporal

Between 1956-60 and 1961-64, capital expenditures for sewerage infrastructure experienced an increase of almost $120 million per annum or 36% in 1982 dollars (Figure 5.2; Table 5.1). This increase is about three-quarters of the annual level of the STP loans, which were introduced in 1961, thus suggesting an influence on municipal infrastructure spending levels by CMHC moneys. Seaden's analysis of data for this purpose,

FIGURE 5.1
FINANCIAL LEVERAGE COMPONENT

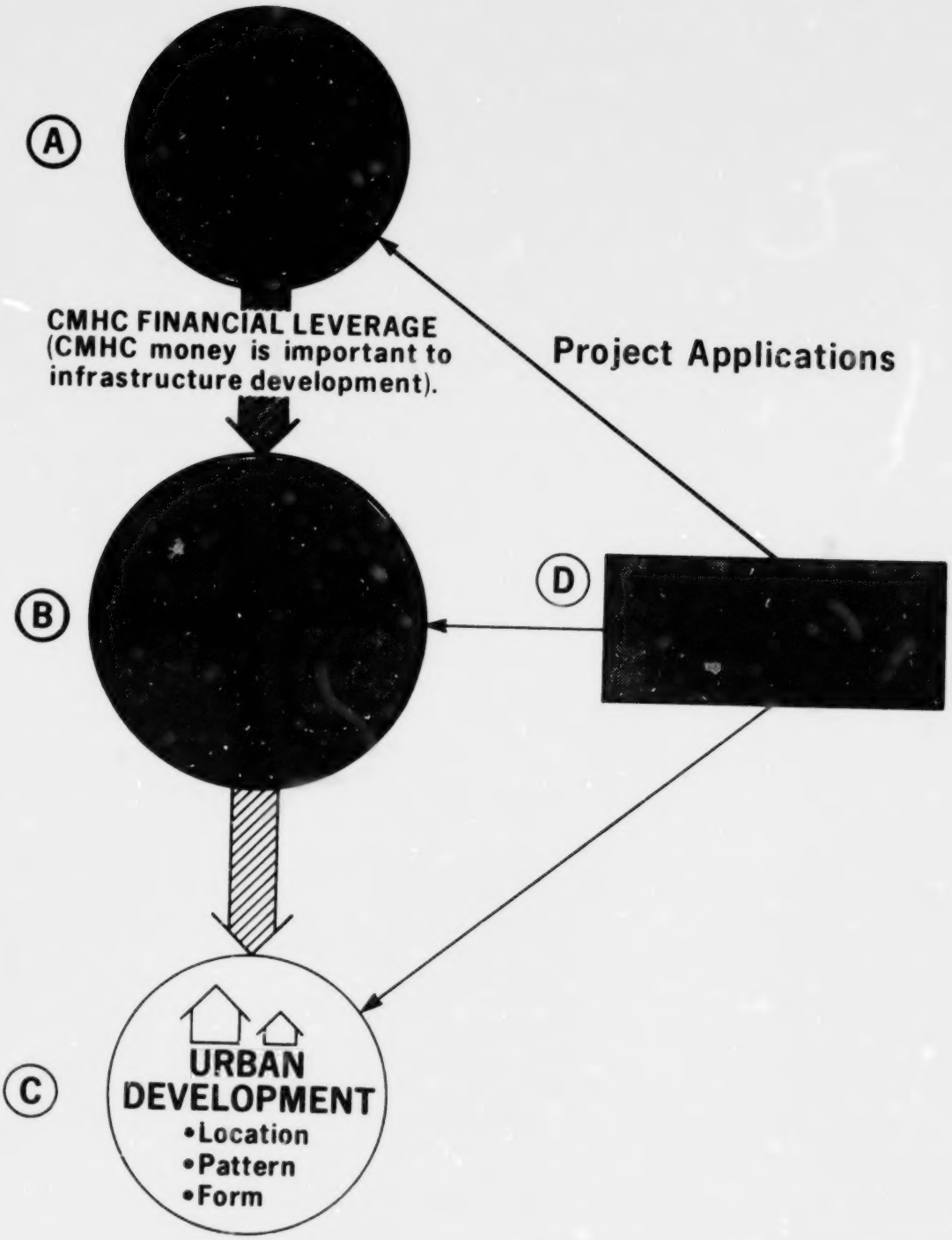


TABLE 5.1:

SIGNIFICANCE OF CMHC MUNICIPAL INFRASTRUCTURE FUNDING
IN TERMS OF TOTAL CAPITAL EXPENDITURES ON SEWERAGE AND WATER, 1956 TO 1982: TEMPORAL ANALYSIS[a]

Program/Period	Total Municipal Capital Expenditures		CMHC Assistance				
			Loans		Grants		
	Sewerage only 1982 dollars (millions per annum)	Sewerage and Water, 1982 dollars[b] (millions per annum)	1982 dollars (millions per annum)	% of Expenditures	1982 dollars (millions per annum)	% of Expenditures
1956-60	325.6	ND	NIL	---	NIL	---
SEWAGE TREATMENT PROGRAM:				% of Sewerage only:		% of Sewerage only:
1961-64	444.4	ND	153.3	34.5%	18.4	4.1%
1965-68	437.2	866.6	114.2	26.1%	26.9	6.2%
1969-74	520.4	886.2	270.2	51.9%	34.2	6.6%
Average per annum (1961-74)	474.9	878.4 (1965-74 only)	192.2	40.5%	27.6	5.8%
MUNICIPAL INFRASTRUCTURE PROGRAM:				% of Sewerage and Water:		% of Sewerage and Water:
1975-78	795.5	1,491.6	381.0	25.5%	144.6	9.7%
COMMUNITY SERVICES CONTRIBUTION PROGRAM:						
1979-80	601.1	1,251.5	NIL	---	128.4	10.3%
AFTER CMHC'S INFRASTRUCTURE PROGRAMS:						
1981-82	587.1	1,461.2	NIL	---	NIL	---

ND - No data.

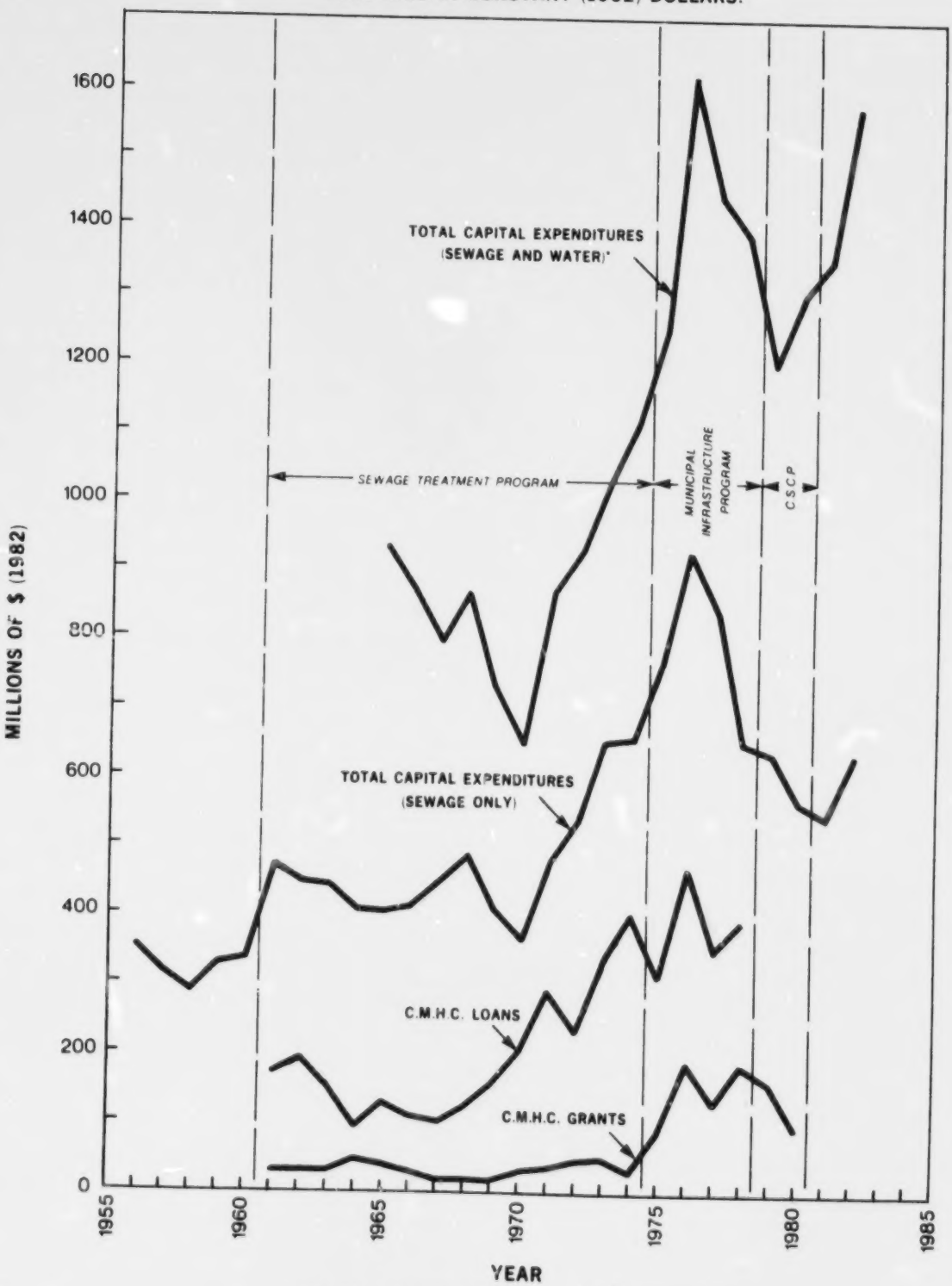
[a] Dollar values are indexed to 1982, using Statistics Canada's composite (cost) index for non-residential building materials and wage rates (CMHC, 1962-1983).

[b] Storm-drainage projects not included.

SOURCES: Derived from Canada/Statistics Canada (1960-1982a, b); Marr (1982, 1983); CMHC (1962-1983).

FIGURE 5.2

COMPARISON OF C.M.H.C. MUNICIPAL INFRASTRUCTURE FUNDING WITH CAPITAL EXPENDITURES FOR SEWERAGE AND WATER SUPPLY, 1956-1982 IN CONSTANT (1982) DOLLARS.



* STORM DRAINAGE PROJECTS NOT INCLUDED

SOURCES: DERIVED FROM STATISTICS CANADA (1960 TO 1982 a, b) ; MARR (1982, 1983) , CMHC (1962 TO 1982)

though, noted a Statistics Canada definitional change at 1961. He concluded that this made it unlikely that any leverage could be safely inferred from these data (Seaden, 1970, Vol. 2, pp. 9-10). If 1961 and 1962 levels of capital expenditure on sewerage (Figure 5.2) are taken as a baseline, it can be seen that these expenditures actually declined and remained generally below this baseline until 1972. From this, there is no clear evidence of substantial leveraging of additional provincial and local funding over and above CMHC loan amounts.

In the 1961 to 1968 period, during which STP loans experienced a decline of about one-quarter, sewerage expenditures remained relatively stable. When CMHC annual loans more than doubled (increasing by $156 million; 137%) between 1965 to 1968 and 1969 to 1974, the absolute increase in sewerage expenditures was again not as great. After 1975, both water supply and storm sewer expenditures were also eligible for assistance. Nevertheless, expenditures for sewerage and water outstripped the substantial increase in MIP loans, a 41% increase in expenditures over the levels of 1969 to 1974. In 1979 and 1980, when the loans portion of CMHC funding had ended, grants continued at a somewhat reduced rate, although expenditures declined by an almost similar amount. On the other hand, when the funding began to substantially dry up in 1981 and 1982, expenditures broke the pattern of relationship to CMHC assistance, rebounding to the levels of the mid-seventies despite the recessionary period.

On balance, and taking into account the nature of this issue, this evidence suggests that CMHC funding significantly fueled spending on sewerage infrastructure, but did not add substantially to total infrastructure spending beyond the value of its loans, except possibly in the late 1960's and early 1970's. By the early 1980s, CMHC infrastructure funding did not appear to remain a significant factor in determining the absolute quantity of infrastructure spending. Virtual cessation of CMHC funding was paradoxically accompanied by substantial increases in sewerage and water spending in 1981 and 1982.

Many provinces and municipalities had made tremendous strides in developing and implementing planning system in the late 1960s and early 1970s. Since bulk of assistance under these programs appears to have occurred after 1972 and the pace of urban growth had slowed tremendously since the late 1960s, more rational, planned urban development may have occurred using MIP-subsidized infrastructure. This contention will be partially examined in chapter 7.

5.2 Analysis of Financial Leverage: Geographic

The proportion of total sewerage and water supply expenditures covered by CMHC loans and grants, as a measure of their relative significance in a region or province, are presented in tables 5.2 and 5.3. As absolute measures, these data are variously flawed (e.g., storm drainage expenditures are not included). Nevertheless, Table 5.2 demonstrates that Ontario and Quebec received more than two-thirds of all infrastructure loan funds and that the municipalities of five provinces deviated substantially from the mean proportion of infrastructure capital expenditures provided by CMHC infrastructure loans (27.7%). Two of these five, Alberta and Saskatchewan received quite low proportions of CMHC loans and therefore the potential for leverage vis-à-vis urban infrastructure and

impact on urban development was quite low. A provincial infrastructure assistance program in Alberta and slower-growth high-density urban development with ease of availability of land for the less expensive lagoon-type treatment in Saskatchewan may well account for this situation (CMHC, 1979a). In three other provinces, Ontario, Prince Edward Island, and Manitoba, a pattern of high proportional use of CMHC loans may well have elevated their potential for leverage/impact.

Since grants for municipal infrastructure represented additional free money, they may have been even more important levers than loans. Grants consist of loan forgiveness, high-cost grants, and grants to non-NHA-financed projects- approximately equivalent to loan forgiveness. In Quebec's municipalities, the lowest proportion of municipal infrastructure grants compared to expenditures contrasts with its higher proportion of loans, possibly indicating a much lower than average overall level of financial leverage there (Table 5.2). The quite high proportion in Newfoundland, likely resulting from the receipt of high-cost grants by small municipalities, as well as the higher than average values for all Atlantic provinces and Ontario suggest somewhat greater potential leverage in urban development for CMHC infrastructure grants in these areas.

When regional level data are analyzed over time (see brackets, Table 5.3), only the high proportion of Ontario's loans and the low proportions of Prairie loans stand out. While Ontario took a relatively constant high proportion of its infrastructure expenses from the program over time, the prairie provinces' lower proportion has been primarily based on the very low use of the later MIP by Alberta and Saskatchewan, very likely due in Alberta to the more attractive financing of that province's infrastructure program (CMHC, 1979a). Québec, Nova Scotia, and Newfoundland, on the other hand, made much lower proportionate use of the STP than the MIP.

Due to this pattern of use, the MIP tended to assist a wider range of infrastructure and, by virtue of its timing (as discussed in 5.1), assisted urban development when greater development and implementation of local planning systems had taken place in many provinces and municipalities.

In summary, CMHC municipal infrastructure assistance was substantial. CMHC loans subsidized about one-third of municipal capital expenditures on sewerage and water and grants paid directly for almost one-tenth of such expenditures. Nevertheless, CMHC assistance probably did not change the overall level of municipal infrastructure spending, except possibly in the late 1960s and early 1970s. A complex geographical pattern of regional/provincial differences has emerged, suggesting greater potential leverage in Ontario and the Atlantic provinces.

TABLE 5.2:

SIGNIFICANCE OF CMHC MUNICIPAL INFRASTRUCTURE LOANS AND GRANTS 1961 TO 1978: A PROVINCIAL COMPARISON

Province (Ranked by column #3)[a]	CMHC Loans, 1961 to 1978		CMHC Grants, 1961 to 1978	
	($'000,000s) (2)	% of Capital Expenditures (3)	($'000,000s, Estimated)[b] (4)	% of Capital Expenditures (5)
Alberta	$ 77.6	10.3%	$ 57.0	7.6%
Saskatchewan	$ 29.9	17.0%	$ 12.4	7.1%
British Columbia	$ 232.1	23.0%	$ 77.5	7.7%
Newfoundland	$ 32.9	25.1%	$ 6.7	13.0%
Quebec	$ 616.1	25.2%	$100.4	4.2%
CANADA/TOTAL	$2,004.1	27.7%	$525.5	7.3%
New Brunswick	$ 56.6	29.3%	$ 17.7	9.1%
Nova Scotia	$ 59.7	30.6%	$ 15.6	8.0%
Ontario	$ 822.8	37.6%	$214.7	9.8%
Prince Edward Island	$ 8.7	43.5%	$ 1.7	8.5%
Manitoba	$ 67.5	44.8%	$ 10.1	6.7%

[a] Ranked by percentage of capital expenditures for municipal infrastructure accounted for by STP and MIP loans (only). See Table 5.2 for explanation of capital expenditures data.

[b] Estimated (except for total). Provincial data before 1970 for loan forgiveness (only) prorated. Only $59.7 million or 11.4% of grants were issued before 1970. Includes loan forgiveness, high cost grants, and those for non-NHA financed projects (equivalent to loan forgiveness).

Sources: Statistics Canada (1960-1982a, b); Marr (1982, 1983).

TABLE 5.3

SIGNIFICANCE OF LOANS UNDER SEWAGE TREATMENT AND MUNICIPAL INFRASTRUCTURE PROGRAMS, BY PROVINCE, 1961 TO 1978[a]

Province	Sewage Treatment Program, 1961 to 1974				"Municipal Infrastructure Program 1975 to 1978"			
		CMHC Loans				CMHC Loans		
	Capital Expenditures, Water and Sewerage[b] ($'000,000s) (2)	($'000,000s) (3)	% of Capital Expenditures (4)		Capital Expenditures, Water and Sewerage ($'000,000s) (5)	($'000,000s) (6)	% of Capital Expenditures (7)		% of Capital Expenditures 1961 to 1978 (8)	
Newfoundland	75.7	5.9	7.8%		55.6	27.0	48.6%		25.1%	
Prince Edward Island	8.2	5.8	70.7%	24.4%	11.8	2.9	24.6%	34.1%	43.5%	29.3%
Nova Scotia	119.8	29.0	24.2%		75.1	30.7	40.9%		30.6%	
New Brunswick	66.9	25.4	38.0%		126.6	31.2	24.6%		29.3%	
Québec[b]	1,012.7	171.1	16.9%		1,391.9	445.0	32.0%		25.2%	
Ontario	1,193.7	473.8	39.7%		997.5	349.0	35.0%		37.6%	
Manitoba	82.9	40.4	48.7%		68.7	27.1	39.4%		44.8%	
Saskatchewan	84.0	19.8	23.6%	27.5%	91.7	10.1	11.0%	7.8%	17.0%	16.2%
Alberta	291.0	65.9	22.6%		463.6	11.7	2.5%		10.3%	
British Columbia	562.4	141.9	25.2%		448.2	90.1	20.1%		23.0%	
Territories[b]	6.8	0.3	4.4%		25.2	0.1	0.4%		1.3%	
	3,503.4[b]	979.2	27.9%		3,727.8	1,024.9	27.5%		27.7%	

[a] Storm drainage projects not included.
[b] For 1961-64, includes only "sanitation and waste removal" and for 1961 to 1966 does not include Quebec and the Territories.

SOURCES: Statistics Canada (1960-1982a, b); Marr (1982, 1983).

6. RELATIONSHIP OF CMHC INFRASTRUCTURE ASSISTANCE TO URBAN DEVELOPMENT CHARACTERISTICS

This chapter focusses on the nature of urban development supported by CMHC municipal infrastructure funding (Figure 6.1). After describing the computer data bases utilized (section 6.1) and the methods of data analysis (6.2), the chapter evaluates in turn hypotheses 2a) through c). These are tested by investigating if MIP funding was proportionately greater than population of certain groups of urban centres would appear to warrant:

2a) MIP funding promoted greater consumption of rural land because it tended to focus on larger centres and those growing less land-efficiently (i.e. consuming more land per additional person accommodated; section 6.3);

2b) MIP funding was demand-responsive because it tended to focus on centres which were faster-growing (population growth rate and urban area growth- absolute and as a rate; section 6.4); and

2c) MIP funding tended to focus on centres which consumed greater amounts and proportions of current and potential cropland (section 6.5).

The approach of this analysis is national level correlation of these variables (CMHC infrastructure funding versus land characteristics of urban area development). It is recognized that such an approach is not sufficient for proof of causation.

6.1 The Data

These three "sub-hypotheses" will be evaluated in this chapter using both the urban land characteristics and CMHC project data sets (described in section 4.3). The first of these principally consist of land consumption characteristics (vis-à-vis land use and capability) and population growth data for 55 of the larger urban centres- those centres which are represented in the CMHC data set (described below; see Table 6.1). These centres obtained 302 loans accounting for about 44% of "all eligible costs" in the one-third sample under the Municipal Infrastructure Program (MIP), a total of $410 million. Eligible costs under the MIP were outlined in Table 3.1- these included sewage treatment plants and sanitary trunk sewers, storm sewers and water supply projects (the latter two in new areas only), and regional sewerage and water plans. Often projects submitted to MIP contained elements not eligible for assistance (e.g. sewer lines on individual streets), which were therefore not assisted.

It should be noted too that these analyses do not include certain classes of centres. First, rural municipalities, towns not within an urban agglomeration (25,000+), and urban centres less than 25,000 total population are excluded because urbanization data (the basis of the urban characteristics data base) are unavailable (Table 6.1). The one-third CMHC sample data base contained 419 loans to these smaller centres and rural areas, subsidizing $206 million of eligible infrastructure costs financed under the MIP or 22% of the MIP-sample costs.

Also, 24 urban centres of 25,000 population or more, which were not represented in the random CMHC sample of MIP projects, were therefore eliminated from the urban characteristics data for comparisons purposes. These centres contained 986,087 people in 1976, only 6.7% of the population of all 80 urban centres in Canada containing 25,000 or more.

Finally, these analyses omit Montreal (Census Metropolitan Area) with a 1976 population of slightly over 2.8 million, 14.9% of that of

FIGURE 6.1
URBAN CHARACTERISTICS COMPONENT

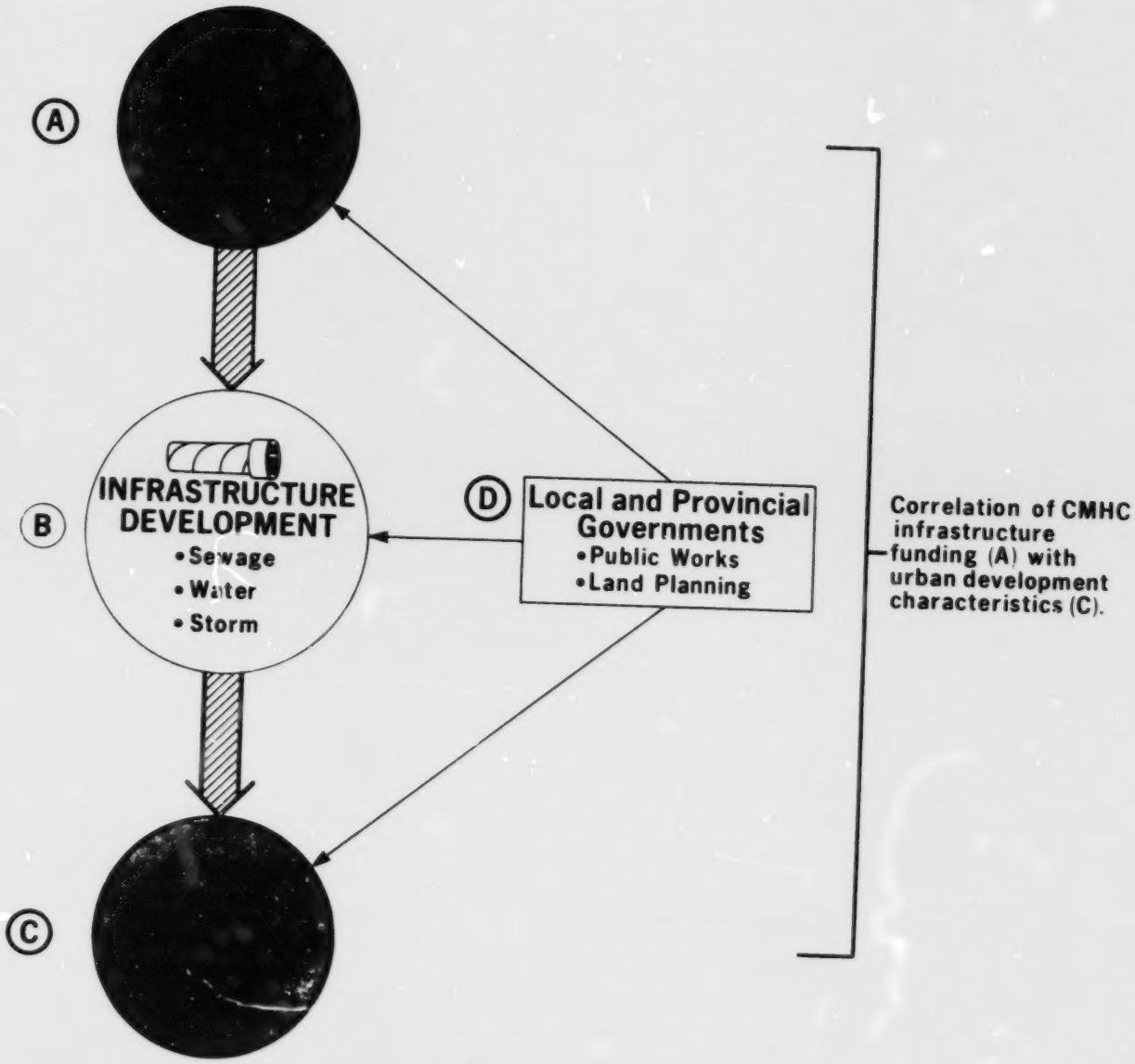


TABLE 6.1:

DISTRIBUTION OF CMHC INFRASTRUCTURE FUNDING IN THE MIP SAMPLE:
LARGE VERSUS SMALL CENTRES AND RURAL AREAS

		Number of Centres	Eligible Costs		MIP Loans/Grants	
			$	%	Number	%
Larger urban centres (census agglomerations; 25,000+)	-Montreal	1	$308	33%	53	7%
	-All other	55	$410	45%	302	39%
		56[a]	$718	78%	355	46%
All smaller centres and rural areas		N/A	$206	22%	419	54%
TOTAL		N/A	$924	100%	774	100%

N/A- Not applicable.
[a] Although there are actually 80 larger centres (over 25,000 population), only 56 were represented in the one-third sample.

the 80 large urban centres in the sample. Montreal received 53 MIP loans subsidizing $308 million of infrastructure, one-third of eligible costs in the sample of MIP projects (Table 6.1). This disproportionate representation would have totally distorted all analyses. Therefore, Montreal was omitted from the tables and is given special consideration below in section 7.4.

The second data set (CMHC) is based upon the systematic sample of 774 MIP projects- project type, eligible costs, etc.. A summary of these data is presented in Table 6.2, which shows eligible costs by project type and region. The CMHC sample data set represents eligible costs of over $920 million, over one-third of which went to each Ontario and Québec. When compared to actual loans made under the MIP (final lines of the table) it appears that, with the exception of the prairie provinces (which are apparently much overrepresented), the regional proportions of the sample are approximately correct (given that the mean costs of projects vary among regions).

Communities in the Atlantic region continued to utilize MIP (sample) funds almost exclusively (93.8%) for sanitary sewerage and sewage treatment plants. Over two-fifths of the funding in Quebec supported the construction of sanitary trunk sewers. More than one-fifth of spending in both Québec and BC was for water mains/supply. Only in the prairie provinces was the proportion spent on storm trunk sewers significant. Combinations of projects were prevalent in Ontario, the prairie provinces, and British Columbia. Unfortunately, it has not been possible to conclude whether these patterns reflect actual differences in servicing deficiencies, the filling of gaps in provincial infrastructure programs, or a policy preference at either the provincial or municipal level.

6.2 Data Analysis

The analysis is presented in a series of tables, in the format of Table 6.3, which contain the following information for the 55 centres for which project data were available:

1) categories of the particular variable involved in the analysis, for example in Table 6.3, the area around each urban centre which was urbanized between 1966 and 1976 (column #1); a hectare is equivalent to 2.471 acres;

2) the number of centres in each category (column #2);

3) the percentage of eligible costs of MIP-subsidized projects in each category of centres (column #3);

4) the percentage of 1976 population (urban portion only) in each of the categories of centres (column #4);

5) the simple difference between proportions of population and eligible MIP costs (expressed compared to population); adjoining categories have usually been combined when the differences are both positive or both negative (column #5); and

6) when available, the percentage of the area newly urbanized accounted for by centres in each of the categories (column #6).

In Table 6.3, for example, 19 of the 55 centres (column #2), containing a total of 21.5% of the population of these centres (column #4), each urbanized between 1,000 and 2,500 hectares of rural land between 1966 and 1976 (column #1). These centres represented 19.3% of MIP-assisted costs (column #3), a proportion which is approximately in line with that of their population (column #4). Column #5 (-2.2%) represents the simple difference in

TABLE 6.2:

MUNICIPAL INFRASTRUCTURE PROGRAM: TYPES OF PROJECTS ASSISTED, 1975 TO 1978 (SAMPLE ONLY)[a]

TYPE OF PROJECT	Canada		Percentage of Total Eligible Costs in Each Type of Development					
	No. of Projects	Eligible Costs ($'000,000)	Canada	Atlantic	Quebec	Ontario	Prairies	British Columbia
Sanitary Trunk Sewers	219	$ 256.6	27.9%	50.7%	41.9%	13.3%	13.2%	26.9%
Sewage Treatment	81	$ 158.3	17.2%	27.1%	14.0%	35.1%	10.1%	7.7%
Combination: Sewage Treatment and Sanitary Trunk Sewer	60	$ 103.8	11.3%	16.0%	17.0%	8.9%	13.8%	11.5%
Water Mains	114	$ 112.0	12.2%	2.6%	21.4%	4.0%	8.7%	17.9%
Central Water Supply	56	$ 53.1	5.8%	0.5%	0.7%	11.9%	7.2%	4.4%
Storm Trunk Sewers	128	$ 45.7	5.0%	1.6%	3.9%	3.9%	13.5%	5.4%
Combination: All Other[b]	88	$ 150.1	16.3%	1.1%	1.1%	27.0%	33.4%	26.2%
TOTAL SAMPLE[a] - percent			100.0%	99.6%[a]	100.0%	99.3%[a]	100.0%	100.0%
- total	771	$ 920.9[a] (100.0%)		$ 62.0M (6.7%)	$342.7M (37.2%)	$335.1M (36.2%)	$101.7M (11.0%)	$ 81.5M (8.8%)
- percent of Canada								
ACTUAL - total	1,618	$1,024.9 (100.0%)		$91.5M (9.0%)	$440.1M (43.4%)	$339.8M (34.1%)	$ 48.9M (4.8%)	$ 90.1M (8.8%)
- percent of Canada								

[a] About $44 million of sampled loans (5% of total sample) are not included in the provincial portion of this table, due to missing "type" data. These loans may exceed "actual loans" due to double-counting associated with multi-phased projects, two or more phases of which may have been sampled.

[b] All other combinations of project types.

M Millions.

SOURCES: MIP sample; CMHC (1962-1983).

TABLE 6.3:

NEWLY URBANIZED LAND AREA, 1966 TO 1976 AND MIP ELIGIBLE COSTS[a]

Area Urbanized, 1966 to 1976 (hectares) (1)	Number of Centres (2)	Percent of Sample MIP Eligible Costs, 1975 to 1978 (3)	Percent of Population, 1976 (4)	Simple Difference in Proportions (MIP costs vs. Population) (5)	Percent of Newly Urbanized Land, 1966 to 1976 (6)
100-249	1	0.1%	0.3%	-0.2%	0.1%
250-499	3	1.9%	1.0%	+1.1%	0.8%
500-999	22	9.3%	9.1%		12.3%
1,000-2,499	19	19.3%	21.5%	-2.2%	24.2%
2,500-4,999	2	19.0%	6.9%	+12.1%	5.6%
5,000-9,999	5	10.7%	26.9%	-16.2%	23.3%
10,000+	3	39.5%	34.3%	+5.2%	33.6%
	55	100.0% 410,000K	100.0% 11,015K	---	100.0% 123,525 ha

[a] Fifty-five sampled centres only, as described in text. Also, Ottawa and Hull, Sydney and Sydney Mines, and Toronto and Halton Hills are each considered as separate centres. This note applies also to the subsequent similar tables in this chapter.

percentages between columns #3 and #4, (19.3 minus 21.5%), the difference between the percentage of population living in and funding to centres each urbanizing between 1,000 and 2,499 hectares in the period. This difference is used as the fundamental basis of the analysis below. These 19 centres urbanized 24.2% of the total area converted by the 55 centres (column #6), about 3% more than their population might suggest. These tables allow a comparison of the percentage of all MIP-subsidized costs for infrastructure with the total population for a given group of urban centres.

It should be reiterated that these analyses are at the national level and constitute only a correlation or comparison between the level of CMHC infrastructure assistance and the urbanization characteristics of these centres, not a demonstration of cause and effect (see Figure 6.1). Discussion and illustration of instances of direct cause and effect between CMHC funding and the nature and extent of growth in particular urban centres and rural areas is carried out in Chapter 7.

"Costs" (or eligible costs) are used in this analysis as a surrogate for CMHC financial assistance, which data were not available on the CMHC data base. Loans were generally for two-thirds of eligible costs of a given project (and the grants, gifts of one-sixth); therefore, there is a very high correlation between the level of assistance and eligible costs. In addition, this approach avoids the logical problem of adding loans and grants together. The decision to do so was based on an extensive review of CMHC project files.

It should also be noted that the MIP project data are for the years 1975 to 1978, the only period in which relatively complete and reliable data are available. The data for land urbanized are for the period 1966 to 1976, again the period for which data are available. As a consequence, decisions on MIP projects (1975 to 1978) occurred within the context of the development experience (1966 to 1976) of the various urban areas. It is not intended that causation of urban growth patterns be inferred directly from the current analysis.

6.3 Greater Urbanization of Rural Land (Hypothesis #2a)

Did CMHC infrastructure funding tend to encourage greater urbanization of rural land than otherwise might be expected? This section contains analyses of the relationship of MIP-eligible costs (and therefore funding) to the population of urban centres and to the land efficiency (density) of their urban growth. No clear evidence of this encouragement of greater urbanization has been found by this analysis.

1) Population

There is a remarkable similarity in the proportions of MIP funding and population, except in centres over 250,000 (Table 6.4). And if these larger centres are considered as a single group, this same assessment is true for all population categories. The correlation coefficient between population size and area urbanized is in fact quite high (R=0.86; Table 6.5). Thus, these larger centres, each urbanizing over 2,500 hectares in the period and housing two-thirds of all of the population of the 55 centres, received CMHC funding essentially in proportion to their total population (+1.4%). Across all urban size cleasses, it was found that MIP assistance did not focus disproportionately on the most populous centres, but rather was

TABLE 6.4·

POPULATION OF URBAN CENTRES, 1976 AND MIP ELIGIBLE COSTS[a]

Population, 1976[b]	Number of Centres	Percent of Sample MIP-Eligible Costs, 1975 to 1978	Percent of Population, 1976	Simple Difference in Proportions (MIP Costs vs. Population)
20,625-34,999	14	4.6%	3.6%	
35,000-49,999	7	2.0%	2.6%	+0.4%
50,000-99,999	12	7.6%	7.7%	-0.1%
100,000-249,999	12	16.1%	18.0%	-1.9%
250,000-999,999	8	37.8%	32.8%	+5.0%
1,000,000+	2	31.7%	35.3%	-3.6%
	55	100.0% 410,000K	100.0% 11,015K	---

a Grouped for presentation as in Table 6.6.
b Urban portion of centre population only.

TABLE 6.5:

AREA OF LAND URBANIZED, 1966 TO 1976 BY POPULATION, 1976

Population, 1976	Area Urbanized (hectares), 1966 to 1976 (No. of centres)						
	100 to 249	250 to 499	500 to 999	1,000 to 2,499	2,500 to 5,000	5,000+	Total
20,625 to 34,999	1	1	11	1	-	-	14
35,000 to 49,999	-	2	4	1	-	-	7
50,000 to 99,999	-	-	6	6	-	-	12
100,000 to 249,999	-	-	1	11	-	-	12
250,000 to 999,999	-	-	-	-	2	6	8
1,000,000+	-	-	-	-	-	2	2
Total	1	3	22	19	2	8	55

Pearson's R (correlation) = 0.86. Significance = 0.9999+.

distributed according to the population share of centres in the various urban size groups.

2) Land Efficiency of Growth

The 16 urban centres, each accommodating more than 20 new persons per newly urbanized hectare of urban area (that is those growing most efficiently), tended to receive a greater proportion of costs (62.5%) under the MIP than they had population (+7.9%), according to Table 6.6. These 16 centres together housed well over one-half of the population in the sample. As therefore would be expected, the 39 less efficiently-growing centres as a group tended to receive proportionately less MIP funding.

These two analyses are thus inconsistent with the contention that greater amounts of rural land were consumed in centres receiving more infrastructure assistance. As Table 6.7 indicates, larger centres, whether measured by population or urban area, were generally more land-efficient in their growth. Analysis of the same data for all 80 large centres indicates an even stronger relationship; this suggests that centres receiving little CMHC assistance were less growth-efficient than those that received more assistance. Perhaps, the existence of sewerage and water infrastructure focussed growth more densely in larger centres than elsewhere. Also, high land prices and the desire for access to the urban core tends to encourage development at higher densities in larger centres.

Nevertheless, larger centres, even if land-efficient in their growth, may still consume more total land in areas of highest land capability; this possible relationship to MIP-eligible costs is examined in section 6.5, as well as in Chapter 7. In addition, these larger centres have quite strong, widespread effects on the rural-urban fringe in terms of land prices, land idled by speculation and uncertainty, and settlement on farming areas. None of these are examined in the present report.

6.4 Demand Responsiveness (Hypothesis 2b)

Was CMHC infrastructure funding largely demand-responsive? Did it therefore tend to focus on the faster-growing centres, which had the greater demand for infrastructure and therefore had the potential to fuel further development of land? The analyses of the relationship of MIP costs to growth of urban population and urbanized area appear to be contradictory. They show a strong positive relationship of MIP cost to population growth rates, but only a directly proportional one to urban area growth rates. This apparent contradiction is partly explained by the fact that centres with higher population growth rates (which the MIP favoured) tended to grow at higher population densities (i.e. use land efficiently; Table 6.8), and therefore did not necessarily experience higher urban area growth.

1) Population Growth Rate

There appears to have been a tendency for CMHC-assisted infrastructure costs to go to the 13 most rapidly-growing centres (3.0%+ per annum) in much greater proportion than their population (+8.3%; Table 6.9). This finding is as expected, since MIP-funding, even more than that of the Sewage Treatment Program, emphasized the servicing of land for new development. The converse was true for the 10 moderate-growth centres (2.0 to 2.9% growth per annum; -10.9%), which contained over half of the population of the 55 centres. As a group, the 32 lower-growth centres (less than 2.0% growth per annum) though received

TABLE 6.6:

LAND EFFICIENCY OF URBAN GROWTH, 1966 TO 1976 AND MIP ELIGIBLE COSTS

Population Growth Efficiency (persons/ha), 1966 to 1976	Number of Centres	Percent of Sample MIP-Eligible Costs, 1975 to 1978	Percent of Population, 1976	Simple Difference in Proportions (MIP Costs vs. Population)
Less than 0.1	3	0.1%	1.1%	
0.1-4.9	11	4.3%	6.7%	-3.4%
5.0-9.9	14	16.3%	14.1%	+2.2%
10.0-14.9	9	14.9%	17.6%	
15.0-19.9	2	1.7%	5.9%	-6.9%
20.0-29.9	12	27.1%	17.8%	+9.3%
30.0-49.9	4	35.4%	36.8%	-1.4%
	55	100.0% 410,000K	100.0% 11,015K	---

TABLE 6.7:

LAND EFFICIENCY OF URBAN GROWTH IN CANADA, 1966 TO 1976, BY POPULATION AND URBAN AREA OF CENTRE

	Number of Centres	New Population Per Hectare Newly Urbanized, 1966-1976[a]
POPULATION OF CENTRES, 1976:		
Negative Population Growth	3	Negative
25,000-50,000	19	9.5
50,000-100,000	11	11.2
100,000-250,000	12	17.8
250,000-500,000	5	15.1
500,000+	5	20.6
Total/Average	55	13.4
URBAN AREA OF CENTRE, 1976 (HECTARES):		
Negative Population Growth	3	Negative
500-2,000	6	10.7
2,000-4,000	15	10.5
4,000-10,000	16	13.0
10,000-20,000	9	17.0
20,000+	6	18.4
Total/Average	55	13.4

[a] Much area newly urbanized is used for non-residential purposes; the importance and relevance of this factor may vary significantly among centres.

SOURCE: Derived from Warren and Rump (1981).

TABLE 6.8:

GROWTH DENSITY BY POPULATION GROWTH RATE, 1966 TO 1976

Population Growth Rate (per annum), 1966 to 1976	Growth Density (additional persons per new hectare), 1966 to 1976							
	Negative	0 to 5	5 to 10	10 to 15	15 to 20	20 to 30	30 to 50	Total
Negative	3	-	-	-	-	-	-	3
0.0 to 0.9%	-	10	4	-	-	-	-	14
1.0 to 1.9%	-	1	6	5	1	2	-	15
2.0 to 2.9%	-	-	4	1	1	2	2	10
3.0 to 4.9%	-	-	-	2	-	5	2	9
5.0%+	-	-	-	1	-	3	-	4
Total	3	11	12	9	2	12	4	55

TABLE 6.9:

POPULATION GROWTH RATE, 1966 TO 1976 AND MIP ELIGIBLE COSTS

Rate of Population Growth Per Annum, 1966 to 1976	Number of Centres	Percent of Sample MIP-Eligible Costs, 1975 to 1978	Percent of Population, 1976	Simple Difference in Proportions (MIP Costs vs. Population)
Negative	3	0.2%	1.1%	-1.3%
0.0-0.9%	14	8.5%	8.9%	
1.0-1.9%	15	28.3%	24.4%	+3.9%
2.0-2.9%	10	39.5%	50.4%	-10.9%
3.0-4.9%	9	19.7%	13.4%	+8.3%
5.0%+	4	3.7%	1.7%	
	55	100.0% 410,000K	100.0% 11,015K	---

infrastructure funding under the MIP at a level "appropriate" to their population.

2) Urban Area Growth

The relationship between the level of CMHC infrastructure funding and the extent of area newly urbanized is not clear cut (Table 6.3- refer to section 6.2). Nevertheless, it can certainly be said that the eight centres which urbanized the largest quantities of rural land (i.e. 5,000 hectares or more each) represented less MIP-eligible costs overall than was theoretically warranted by their population (-11.0%). These centres also accounted for somewhat less (-4.3%) of the total of rural land urbanized by the 55 centres (56.9%) than population appears to have warranted, thus reflecting the land efficiency of urban growth among these generally larger centres. On the other hand, the two centres urbanizing 2,500 to 4,999 hectares, which represented proportionately much more costs than population (+12.1%), urbanized a even lower proportion of rural land (5.6%). It was, in fact, the 45 generally-smaller centres, each urbanizing lesser amounts of rural land (2,500 hectares or less) and representing a proportion of costs (30.6%) similar to that of their population (31.9%), which urbanized a substantially larger proportion of rural land (37.7%; +5.8%) than their population appears to warrant. This reflects the fact that less populous centres, which individually absorb smaller areas of rural land, are nevertheless developing the land less efficiently and urbanizing more land per additional person housed (Table 6.5). Thus, although it varied within groups, this analysis indicates that MIP funding was essentially proportional to urban area growth (based on the population).

3) Urban Area Growth Rate

The three centres experiencing extreme areal growth rates (75.0% or more) represented significantly greater costs by comparison to population (Table 6.10). On the other hand, as a group the 41 centres generating average or greater-than-average percentage increases in urban area from 1966 to 1976 (20% to 75%) received less MIP subsidy than might be warranted by population (-11.8%). The 11 centres with less than average area growth (10.0 to 19.9%) represented proportionately more of the costs than population (+6.7%). Hence, while the few centres of extreme areal growth rates and centres with low percentage areal growth represented proportionately more MIP costs than the share of population warranted, the large number of centres of average or above average areal growth received proportionately less CMHC funding.

Although results of the analysis are not clear cut, CMHC MIP funding tended to be demand-responsive. It was found that, de facto, MIP assistance was allocated to urban centres as a group in proportion to population size and urban area growth, with a greater focus on centres with larger percentage population increases. Analysis based on the urban area growth rate yielded complex results. From the perspective of minimizing the overall consumption of rural land use, it was fortunate that these larger centres grew on the new land area urbanized in an efficient way, with a level of MIP funding generally proportionate to urban size.

6.5 Land Use and Agricultural Capability of Newly Urbanized Areas (Hypothesis #2c)

Did CMHC infrastructure funds support disproportionately those urban centres that expanded onto improved farmland and land with the capability for production of crops? The analysis of the relationship of MIP eligible

TABLE 6.10:

PERCENT INCREASE OF URBAN AREA, 1966 TO 1976 AND MIP ELIGIBLE COSTS

Percent Increase in Urban Area, 1966 to 1976	Number of Centres	Percent of Sample MIP-Eligible Costs, 1975 to 1978	Percent of Population, 1976	Simple Difference in Proportions (MIP Costs vs. Population)
5.0-9.9%	1	0.1%	0.3%	-0.2%
10.0-19.9%	10	30.4%	23.7%	+6.7%
20.0-34.9%	23	44.4%	48.9%	
35.0-49.9%	10	7.3%	13.9%	-11.8%
50.0-74.9%	8	7.8%	8.5%	
75.0%+	3	9.8%	4.8%	+5.0%
	55	100.0% 410,000K	100.0% 11,015K	---

TABLE 6.11:

AREA OF IMPROVED LAND URBANIZED, 1966 TO 1976 AND MIP ELIGIBLE COSTS

Improved Agricultural Area Urbanized (hectares), 1966 to 1976	Number of Centres	Percent of CMHC MIP-Eligible Costs, 1975 to 1978	Percent of Population, 1976	Simple Difference in Proportions (MIP Costs vs. Population)	Percent of Improved Area Urbanized, 1966 to 1976
0-99	6	3.4%	3.5%	-0.1%	0.4%
100-249	12	9.3%	7.0%	+2.5%	2.9%
250-499	12	7.0%	6.7%		6.2%
500-999	12	7.8%	9.2%	-1.4%	12.0%
1,000-2,499	5	18.8%	14.9%	+3.9%	11.9%
2,500-4,999	5	13.7%	24.5%	-10.8%	21.1%
5,000+	3	39.8%	34.3%	+5.5%	45.5%
	55	100.0% 410,000K	100.0% 11,015K	---	100.0% 1,346 ha

costs to the proportion of newly urbanized area (1966 to 1976) which was previously in improved agricultural use or was potentially available for the production of crops (i.e. CLI agricultural capability classes 1 to 3) shows that centres urbanizing the greatest proportion of improved land and the greatest proportions and amounts of potential cropland were as a group in receipt of greater MIP funding than expected on the basis of population. For the amount of improved land urbanized, MIP funding to urban centres was proportional to their group share of population.

1) Improved Agricultural Area

The 13 centres, which each urbanized more than 1,000 hectares of improved agriculture land and represented over 70% of CMHC costs, contained a quite similar proportion of the overall population of the 55 centres (-1.4%; Table 6.11). These centres urbanized almost 80% of the improved area urbanized by sample centres, somewhat higher than the proportions for both costs (+6.5%) and population (+5.5%). These centres were exclusively larger than 100,000 in population in 1976 (Table 6.12). In fact, there is a very high correlation between population size and improved area urbanized (R=0.84). Those centres urbanizing less than 1,000 hectares of improved land contained only 26.4% of the sample population and a quite similar proportion of MIP costs (27.5%; +1.1%), but urbanized a smaller proportion of improved land (-4.9%). On balance, for centres grouped by amount of improved land urbanized, CMHC infrastructure assistance was nearly proportional to each group's share of the total population.

When the percentage of all land urbanized by an individual centre which had been in improved agriculture is considered (Table 6.13), however, the centres urbanizing higher proportions (50% plus), which housed over two-thirds of the sample's population, demonstrated substantially higher proportions of MIP-eligible costs than they contained population (+9.3%). Those with lower levels of urbanization of improved land general showed correspondingly lower proportions of costs. Paradoxically, the six centres with between 10.0 and 19.9% urbanized land (previously) improved represented almost double the MIP-costs compared to population. Nevertheless, these data do suggest that centres urbanizing the highest percentages of improved land represented proportionately larger amounts of CMHC costs.

Overall then, the conclusion is that MIP funds supported centres urbanizing improved agricultural land in porportion to their group's share of the total population. Infrastructure support, however, did focus disproportionately on those centres urbanizing a high percentage of improved land.

2) Potential Cropland (CLI Classes 1 to 3)

Those eight centres which urbanized the greatest absolute amounts of CLI Class 1 to 3 land (2,500 hectares+) represented MIP costs greater than population by 10.6% (Table 6.14). These centres accounted for almost 70% of the cropland urbanized in the period, although they contained only little more than half the population of the sample (+13.3%). These centres were all larger, each over 250,000 in population (Table 6.15). (There is in fact a very high correlation between population size and potential cropland urbanized (R=0.85). The reverse was demonstrated by the 30 centres which urbanized lower amounts of this land (250 to 2,499 hectares). They represented 14.4% less costs than population and 7.5% less potential cropland urbanized. These data suggest that CMHC costs went

TABLE 6.12:

AREA OF IMPROVED LAND URBANIZED, 1966 TO 1976 BY POPULATION, 1976

Population, 1976	Improved Land Area Urbanized (hectares), 1966 to 1976 (No. of Centres)							
	LT100	100-249	250-499	500-999	1,000-2,499	2,500-4,999	5,000+	Total
20,625 to 34,999	3	4	5	2	-	-	-	14
35,000 to 49,999	1	1	4	1	-	-	-	7
50,000 to 99,999	1	5	-	6	-	-	-	12
100,000 to 249,999	1	2	3	3	3	-	-	12
250,000 to 999,999	-	-	-	-	2	4	2	8
1,000,000+	-	-	-	-	-	1	1	2
Total	6	12	12	12	5	5	3	55

Pearson's R (correlation) = 0.84. Significance = 0.9999+.

TABLE 6.13:

PERCENT OF LAND URBANIZED, 1966 TO 1976, WHICH HAD BEEN IN IMPROVED AGRICULTURE AND MIP ELIGIBLE COSTS

Percent of Newly Urbanized Land, Improved Agricultural Land, 1966 to 1976	Number of Centres	Percent of Sample MIP-Eligible Costs, 1975 to 1978	Percent of Population, 1976	Simple Difference in Proportions (MIP Costs vs. Population)
0.0-9.9%	5	3.9%	4.5%	-0.6%
10.0-19.9%	6	7.3%	3.9%	+3.5%
20.0-34.9%	9	5.9%	10.1%	-12.2%
35.0-49.9%	7	5.9%	13.9%	
50.0-74.9%	16	41.0%	30.7%	+10.3%
75.0-100.0%	12	35.9%	36.9%	-1.0%
	55	100.0% 410,000K	100.0% 11,015K	---

TABLE 6.14:

AREA URBANIZED, 1966 TO 1976, WHICH HAD BEEN POTENTIAL CROPLAND (CLI CLASSES 1 TO 3) AND MIP ELIGIBLE COSTS

Area of CLI Classes 1 to 3 Urbanized (hectares), 1966 to 1976	Number of Centres[a]	Percent of Sample MIP-Eligible Costs 1975 to 1978	Percent of Population, 1976	Simple Difference in Proportions (MIP Costs vs. Population)	Percent CLI 1 to 3 Urbanized 1966 to 1976
0-99	8	4.8%	4.4%	+4.1%	0.3%
100-249	8	7.5%	3.8%		2.0%
250-499	9	2.5%	4.9%		4.2%
500-999	13	15.8%	19.2%	-14.4%	12.9%
1,000-2,499	6	4.3%	13.0%		12.5%
2,500-4,999	4	22.6%	14.3%	+10.6%	16.8%
5,000+	4	42.7%	40.4%		51.2%
	52[a]	100.0% 398,000K	100.0% 10,731K	---	100.0% 76,508 ha

[a] Sept-Iles, Victoria, and Kamloops are also omitted from this table, due to lack of agricultural capability data when the base data (Warren and Rump, 1981) were prepared.

TABLE 6.15:

AREA OF CLI CLASSES 1 TO 3 LAND URBANIZED, 1966 TO 1976, BY POPULATION, 1976

Population, 1976	Area of Land Urbanized 1966 to 1976 (hectares), CLI Classes 1 to 3 (No. of Centres)							
	LT100	100-249	250-499	500-999	1,000-2,499	2,500-4,999	5,000+	Total
20,625 to 34,999	3	3	3	4	-	-	-	13
35,000 to 49,999	1	3	3	-	-	-	-	7
50,000 to 99,999	2	1	2	5	1	-	-	11
100,000 to 249,999	2	1	1	3	4	-	-	11
250,000 to 999,999	-	-	-	-	1	4	3	8
1,000,000+	-	-	-	1	-	-	1	2
Total	8	8	9	13	6	4	4	52

Pearson's R (correlation) = 0.85. Significance = 0.9999+.

disproportionately to centres urbanizing larger amounts of potential cropland.

Disproportionately low MIP costs as compared to population appear to have gone to the 22 centres urbanizing less than 50% potential cropland (-6.6%; Table 6.16). By extension, the 30 centres urbanizing greater percentages of high capability agricultural land (50.0% plus), received funding that was correspondingly higher than population (+6.4%).

As is evidenced in both Tables 6.14 and 6.16, there were a few centres that obtained a significant proportion of MIP funding by comparison to their percentage of total population which, in both absolute and percentage terms, urbanized virtually no high quality agricultural land (less than 249 ha or less than 10%). These centres, which include St. John's, Sept Iles, North Bay, and Rouyn, may have received the additional MIP financing ("high cost" grants) available to communities which had to construct sewage infrastructure in difficult terrain.

In sum, these data would support the proposition that MIP funding favoured urban centres which were urbanizing the larger quantities of high capability agricultural land, as well as those urbanizing a larger proportion of such land.

Analyses based on these national statistical comparisons suggest for each sub-hypothesis that:

1) There is no proof that the MIP tended to give disproportionately greater support to urban centres which consumed higher amounts of rural land. CMHC infrastructure assistance was generally in direct proportion to the population share of each urban size class. Moreover, MIP funding was found to have concentrated proportionately more on centres that grew more efficiently, urbanizing less rural land per additional population accommodated.

2) CMHC infrastructure did tend to be demand-responsive. MIP funding was, de facto, allocated in greater proportion to urban centres with higher percentage population increases. Also, it was found that MIP assistance had been distributed generally in proportion to the population share of centres grouped on the basis of population size and urban area growth. (A more complex relationship was found for urban area growth rate.)

3) Finally, it appears that CMHC funding tended to favour centres which disproportionately urbanized greater amounts and proportions of potential cropland (classes 1 to 3 agricultural capability) and those which used the greater proportion of improved land, and funded proportionately to population share those centres which used greater amounts of such farmland.

TABLE 6.16:

PERCENT OF TOTAL AREA URBANIZED, 1966 TO 1976, WHICH HAD BEEN POTENTIAL CROPLAND (CLI CLASS 1 TO 3) AND MIP ELIGIBLE COSTS

Percent of Newly Urbanized Land, CLI 1 to 3, 1966 to 1976	Number of Centres[a]	Percent of Sample MIP-Eligible Costs 1975 to 1978	Percent of Population, 1976	Simple Difference in Proportions (MIP Costs vs. Population)
0.0-9.9%	8	11.0%	5.0%	+6.0%
10.0-19.9%	4	6.3%	12.8%	
20.0-34.9%	5	3.4%	4.4%	-12.6%
35.0-49.9%	5	1.2%	6.3%	
50.0-74.9%	10	17.8%	16.7%	
75.0-100.0%	20	60.2%	54.9%	+6.4%
	52[a]	100.0% 398,000K	100.0% 10,731K	---

[a] Sept-Iles, Victoria, and Kamloops are omitted from this table, due to the lack of agricultural capability data when the base data (Warren and Rump, 1981) were prepared.

7. ON-THE-GROUND LEVERAGE

This chapter focuses on hypothesis 3, that is that the nature and extent of the on-the-ground leverage by CMHC municipal infrastructure funding on urban development depended primarily on the presence, nature, and effectiveness of local land planning (Figure 7.1). The chapter also demonstrates the nature and importance of CMHC funding influences in specific cases.

This chapter begins with a description of the interview program (section 7.1), followed by the brief analyses of linkages between CMHC infrastructure monies and development for 11 of the centres, the case studies. These, it is hoped, represent the full range of experiences of municipalities. Both those with predominantly "good" land-use effects (7.2) and those with mixed impacts (7.3) are described. A somewhat expanded case study for Montréal, including the Communauté Urbaine de Montréal (the island) and three smaller municipalities, is also provided (7.4). These form examples for the analysis of the relationships between CMHC infrastructure assistance on the one hand, and urban development and local land planning on the other which follow in section 7.5. This analysis is based on all 22 centres/areas covered in the planner survey. If the reader wishes, the case studies can be skipped over initially and turned to as references are made to them.

7.1 The Approach

This analysis utilizes interviews with planners and other municipal officials in 22 urban centres and rural areas (Figure 7.2) across the country (see section 4.2). The interviews generally followed the questions listed in the questionnaire included as Appendix A. Information was gathered on the use to which CMHC infrastructure funding was put in general, the nature and impact of individual projects assisted, the nature of the influence of these funds on the municipality's capital works program, the influence of CMHC's approval criteria and processes on urban development, the funding of unnecessary infrastructure, and respondent's views on how to improve future similar infrastructure assistance programs. Additional detailed information was collected for specific projects in each centre, generally three to six in number. Linkages among CMHC funding, infrastructure and the location and nature of urban development were emphasized throughout. A summary of the results for all 22 centres and areas has been included as Appendix B.

This analysis takes into account differences among urban centres in the rate of area growth, the type of development which was subsidized by CMHC infrastructure assistance, and the quality of land being urbanized. Infrastructure development funding may assist at least four different types of urban development (Figure 7.3):

1) urban redevelopment and retro-active provision (retrofit) of infrastructure in previously urbanized areas;

2) urban development of previously undeveloped areas contained within the already urbanized area (infill);

3) urban development of logical and/or planned areas contiguous to previously urbanized area; and

4) scattered development or the development of new communities at some distance from the urbanized area.

Many urban areas exhibit a mixture of these types of development, but often one or two will be predominant (for example, see Figure

FIGURE 7.1
LAND PLANNING COMPONENT

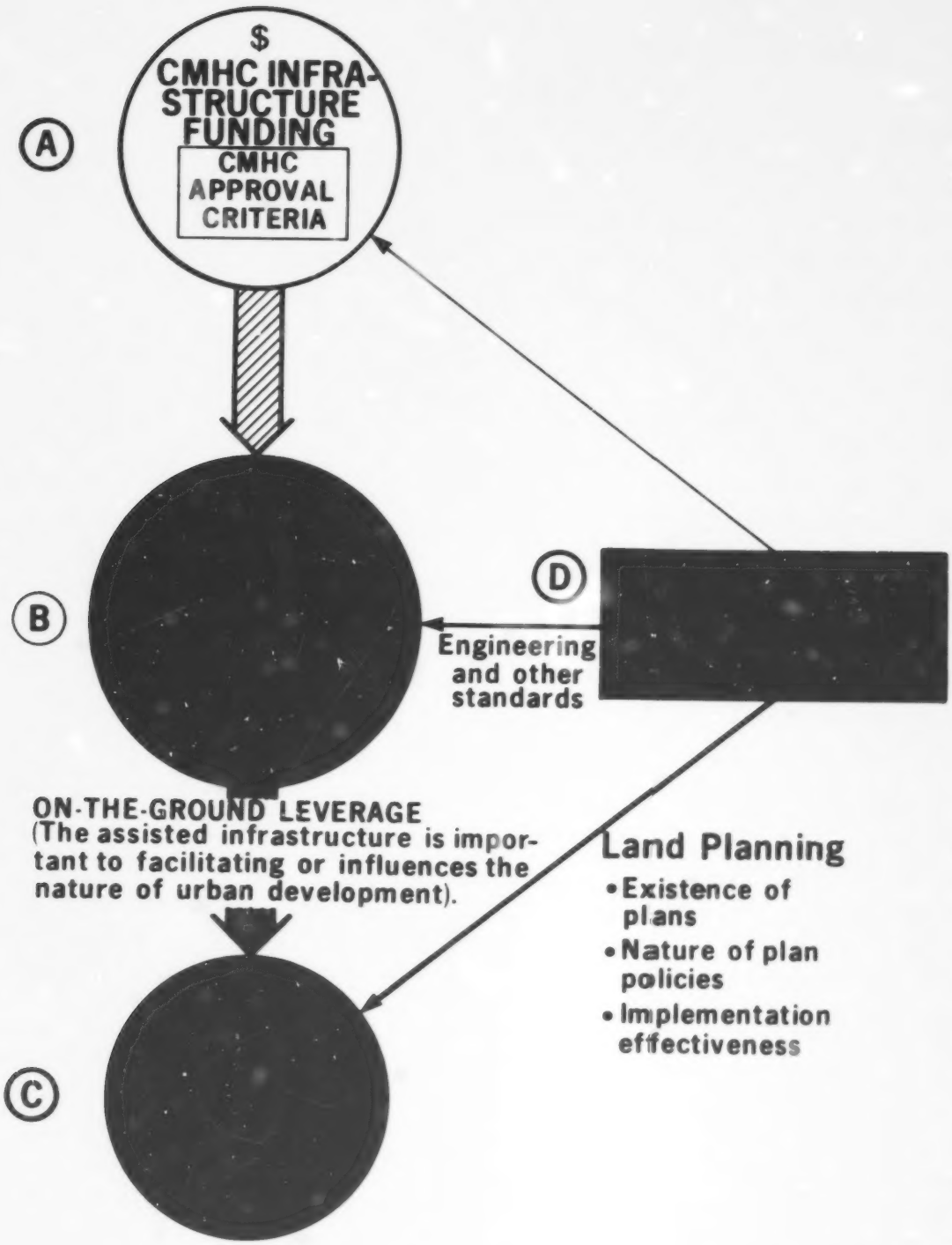


FIGURE 7.2: LOCATION OF SAMPLED CENTRES/AREAS: PLANNER SURVEY

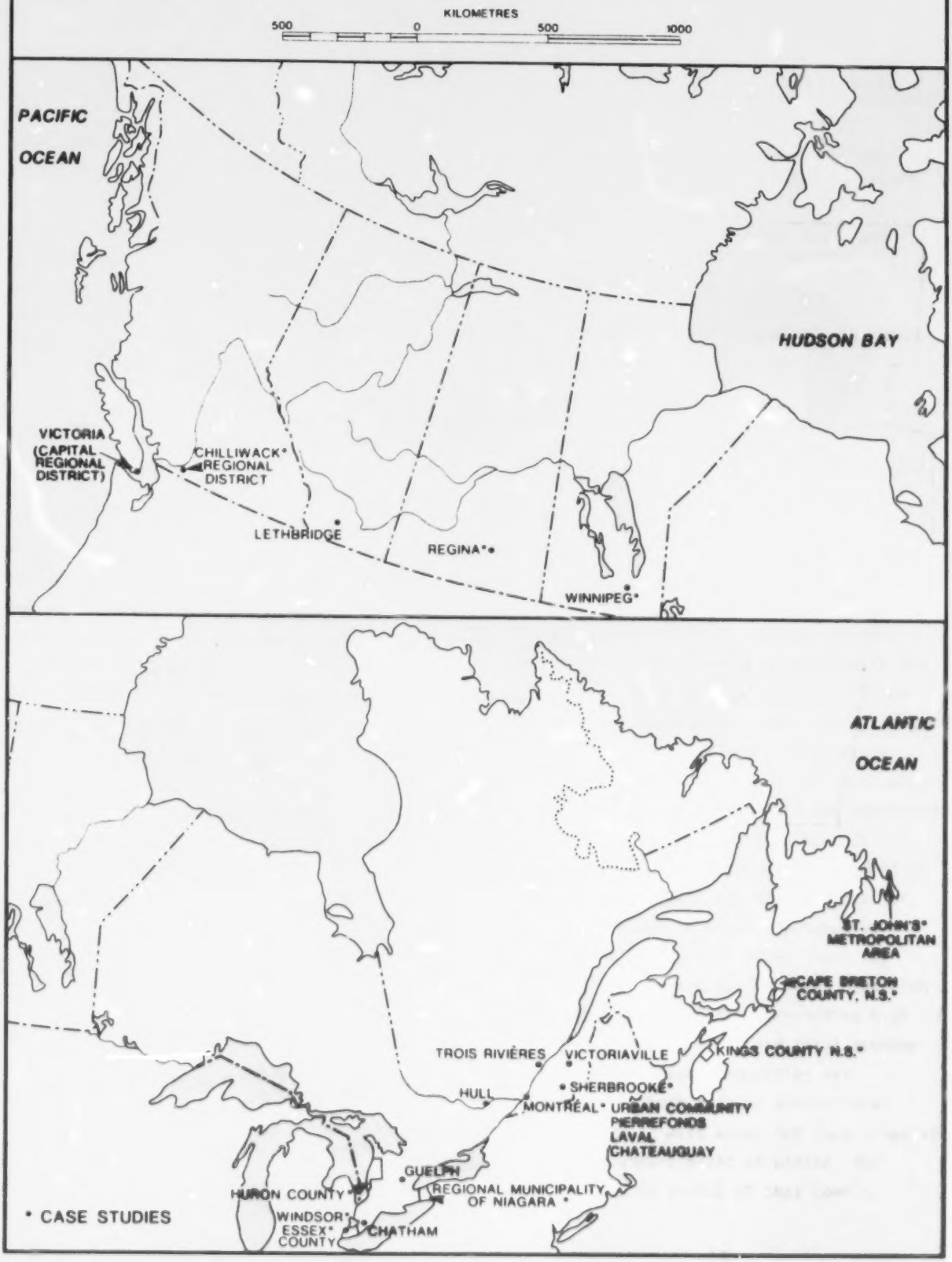
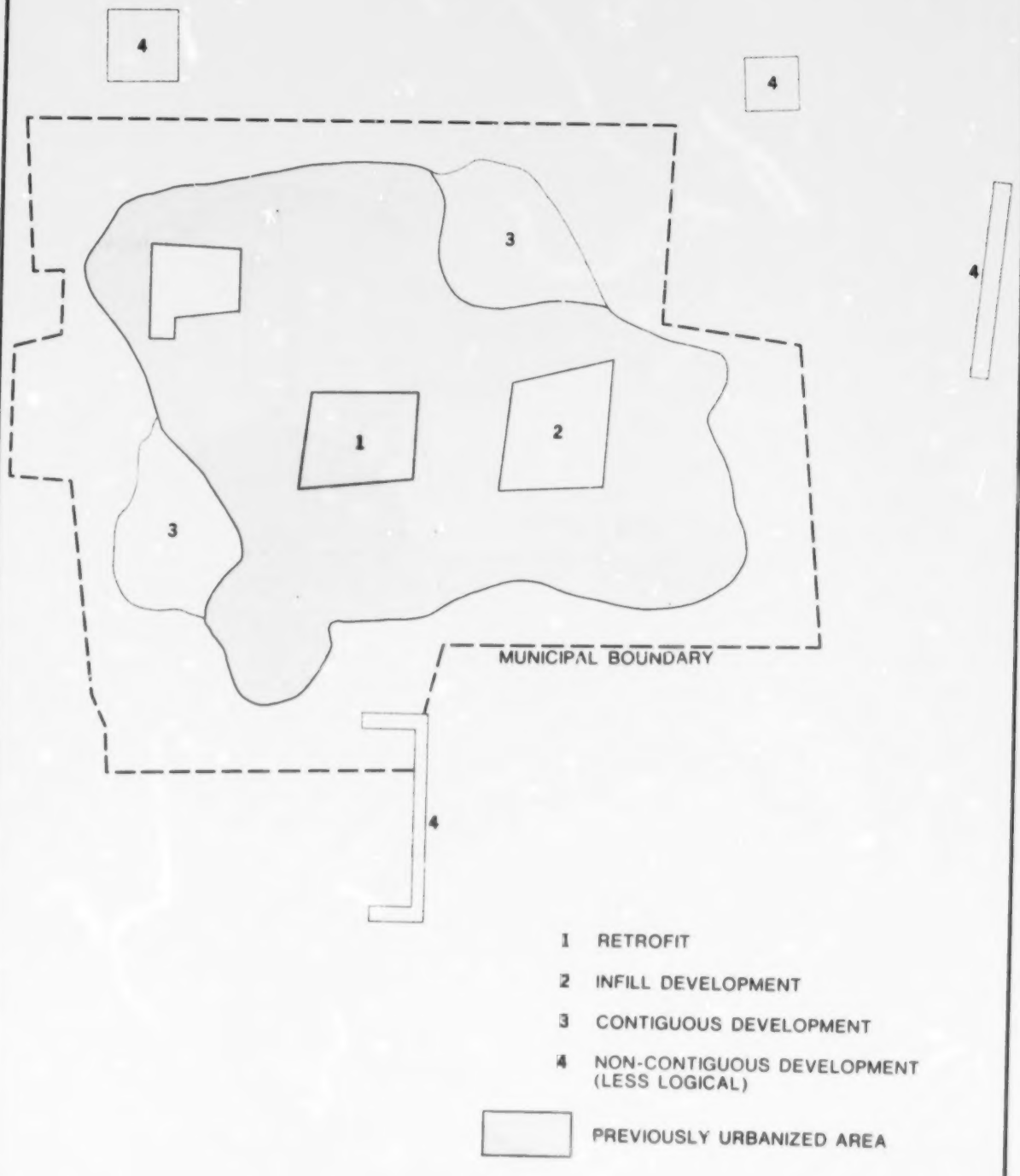


FIGURE 7.3: TYPES OF URBAN DEVELOPMENT



7.5, Winnipeg's urbanization). In addition, the land quality (for agriculture) surrounding a centre and the amount of land which has been urbanized by a given centre have been considered whenever possible.

The role of CMHC assistance in urban development has been assessed so far as was possible in the context of the nature and strength of local land planning in each centre. Did the planning encourage infill, redevelopment, contiguous development, scattered or nodal development? Did it discourage development on high quality resource (agricultural) lands or lands subject to flooding? Was the local land plan, once adopted, supported by effective implementation by the municipality? Was CMHC funding critical or important to the provision of servicing and development of the land? And was the input of CMHC money an aid or hindrance in carrying out the plans? For each centre, this research has attempted to reach conclusions. Thereafter, an effort has been made to determine if the on-the-ground impacts exhibited any pattern at the national level.

7.2 CMHC Support of Sound Local Land Planning: Case Studies

Each of the following case studies begins, to the extent that data are available, with information about the following characteristics:

1) population of the census metropolitan area or census agglomeration in 1976;

2) the population growth rate per annum, 1966 to 1976;

3) the percentage of land within a 24 kilometre (15 mile) radius of the centre, which was CLI agricultural capability class 1 to 3 circa 1966 (after Neimanis, 1979);

4) the total area of land urbanized by the centre (prorated to 1966 to 1976) by Warren and Rump, 1981);

5) the percentage of the area urbanized which was CLI agricultural capability classes 1 to 3 (Warren and Rump, 1981);

6) the density of growth in the centre expressed as additional new persons per new hectare urbanized (after Warren and Rump, 1981);

7) the type(s) of development that the area has experienced over the last 15 years; and

8) the amount of STP and MIP loans and grants in thousands of (current) dollars.

These data provide the context within which the CMHC role can be evaluated.

Case A: Huron County, Ontario

Type of development: Contiguous development around rural service centres.

STP - $ 858 K loans;
MIP - $1,540 K loans;
- $ 78 K grants.

With the introduction of stricter provincial environmental restrictions by Ontario in the early 1970s, the Province refused to allow further development of "inland" towns in Huron County (e.g., Hensall, Seaforth, Exeter; Figure 7.4), due to the small and seasonally intermittent nature of flows in the receiving streams for sewage effluent. The resulting inability of the towns to absorb residential and industrial growth created pressure for rural development, a counter-productive force to the County's Official Plan. By diverting development to the towns, the Plan attempted to preserve the surrounding high quality agricultural land and rural economy. The problem in these communities was compounded by their role as agricultural service centres; wash water for food crops at the Canada Canners plant at Exeter, for example, used up to 50% of that town's

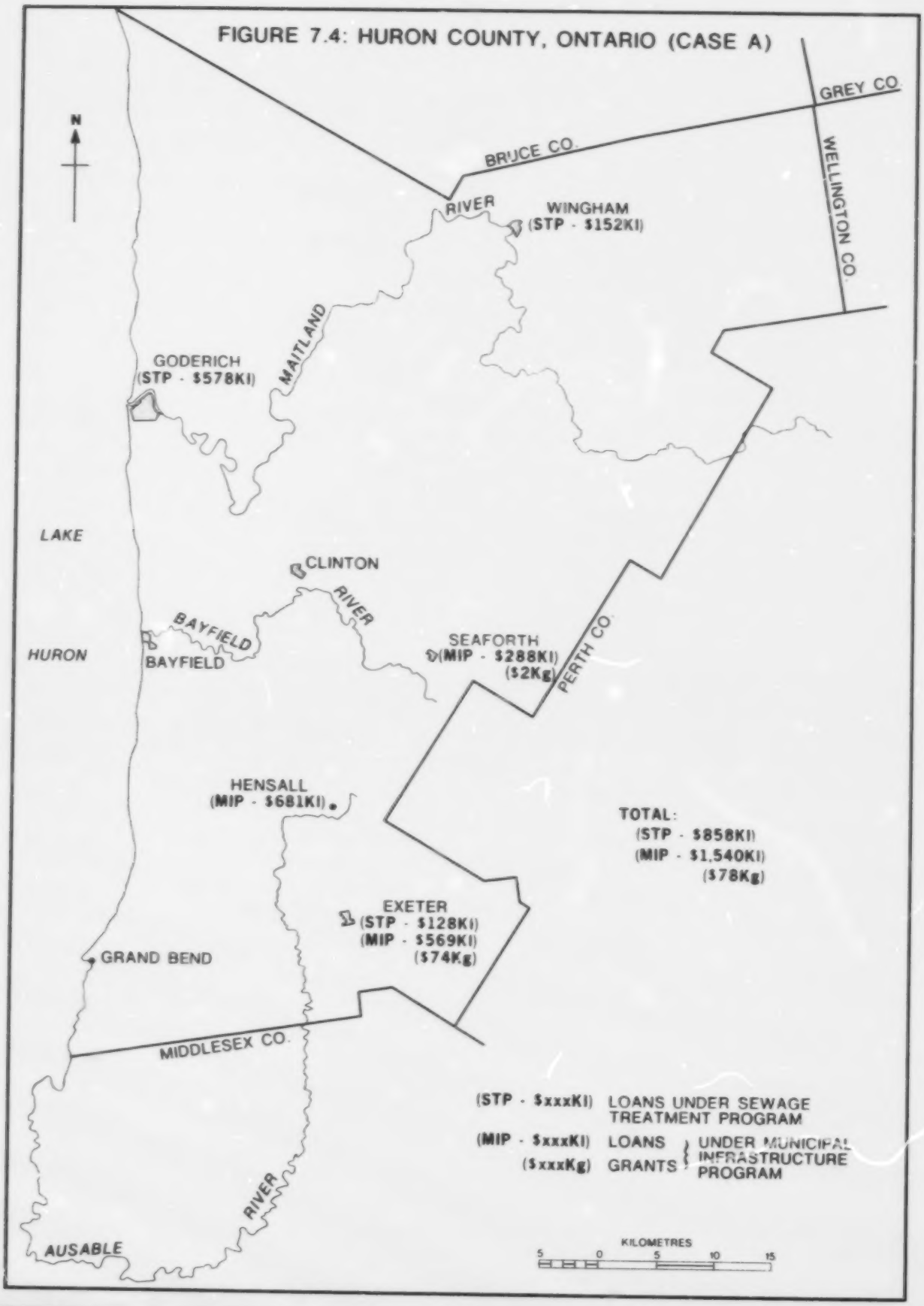


FIGURE 7.4: HURON COUNTY, ONTARIO (CASE A)
N
GREY CO.
BRUCE CO.
WELLINGTON CO.
RIVER
WINGHAM
(STP - $152KI)
MAITLAND
GODERICH
(STP - $578KI)
LAKE
HURON
CLINTON
RIVER
BAYFIELD
BAYFIELD
SEAFORTH
(MIP - $288KI)
($2Kg)
PERTH CO.
HENSALL
(MIP - $681KI)
TOTAL:
(STP - $858KI)
(MIP - $1,540KI)
($78Kg)
EXETER
(STP - $128KI)
(MIP - $569KI)
($74Kg)
GRAND BEND
MIDDLESEX CO.
(STP - $xxxKI) LOANS UNDER SEWAGE TREATMENT PROGRAM
(MIP - $xxxKI) LOANS
($xxxKg) GRANTS
UNDER MUNICIPAL INFRASTRUCTURE PROGRAM
RIVER
AUSABLE
KILOMETRES
5 0 5 10 15

effluent storage capacity. Expansions of sewer systems through CMHC monies enabled these towns to continue to grow, thereby neutralizing rural residential development pressures. The County has been quite successful in stopping this type of development since the Plan came into effect; CMHC funding of sewer systems in these towns has played a major role in this success.

Case B: Winnipeg

Population, 1976:	560,874
Population growth rate per annum, 1966 to 1976:	1.2%
Percent CLI agricultural capability Class 1 to 3 within a 24 kilometre (15 mile) radius:	94.1%
Area urbanized, 1966 to 1976:	5,685 hectares (ha)[a]
Percent newly urbanized area of CLI Class 1 to 3, 1966 to 1976:	99.9%

Growth density, 1966 to 1976: 10.6 persons/ha

Types of development: Contiguous and scattered development (Warren, 1982).

STP - $28,350 K loans;
MIP - $16,849 K loans;
$ 675 K grants.

Winnipeg's population has expanded recently for the most part by contiguous, long-term, phased suburban subdivisions of single-family density (12 to 17 units to the hectare) located well within the limits of the unified city (Figure 7.5) Because of the pattern of previous development, considerable land exists to accommodate development (through infill and redevelopment) for the forseeable future. CMHC funding has assisted a variety of infrastructure services for both retrofit and new contiguous development. It has also been used to provide drainage to a contiguous area which could not otherwise have been developed.

This provision of ample serviced areas "close-in" has aided resistance to pressures for non-contiguous scattered development. Nevertheless, there has been considerable strip and scattered development beyond the ring road (highways 100 and 101), especially to the north-east of the city along the Red River (highways 9, 204, and 59) towards Selkirk and south to Glenlea along Highway 75 (Warren, 1982; Figure 7.5). These areas are well outside Winnipeg's city limits (unicity) and beyond its planning control.

While the city has a high flood hazard, the City, Province, and public are well aware of these hazards due to the famous 1950 flood. There is little pressure for the development of lands so affected, much of which has been turned into parkland.

Since Winnipeg contains an unusually large amount of land in vacant or obsolete use, the capacity for redevelopment, rehabilitation, and small scale infill is excellent. In keeping with this, CMHC is also assisting some servicing in Winnipeg's core area through the Core Area Initiative Program, essentially an extension to the CSCP. This tri-governmental program will put $97 million into revitalizing the city's central area by 1986.

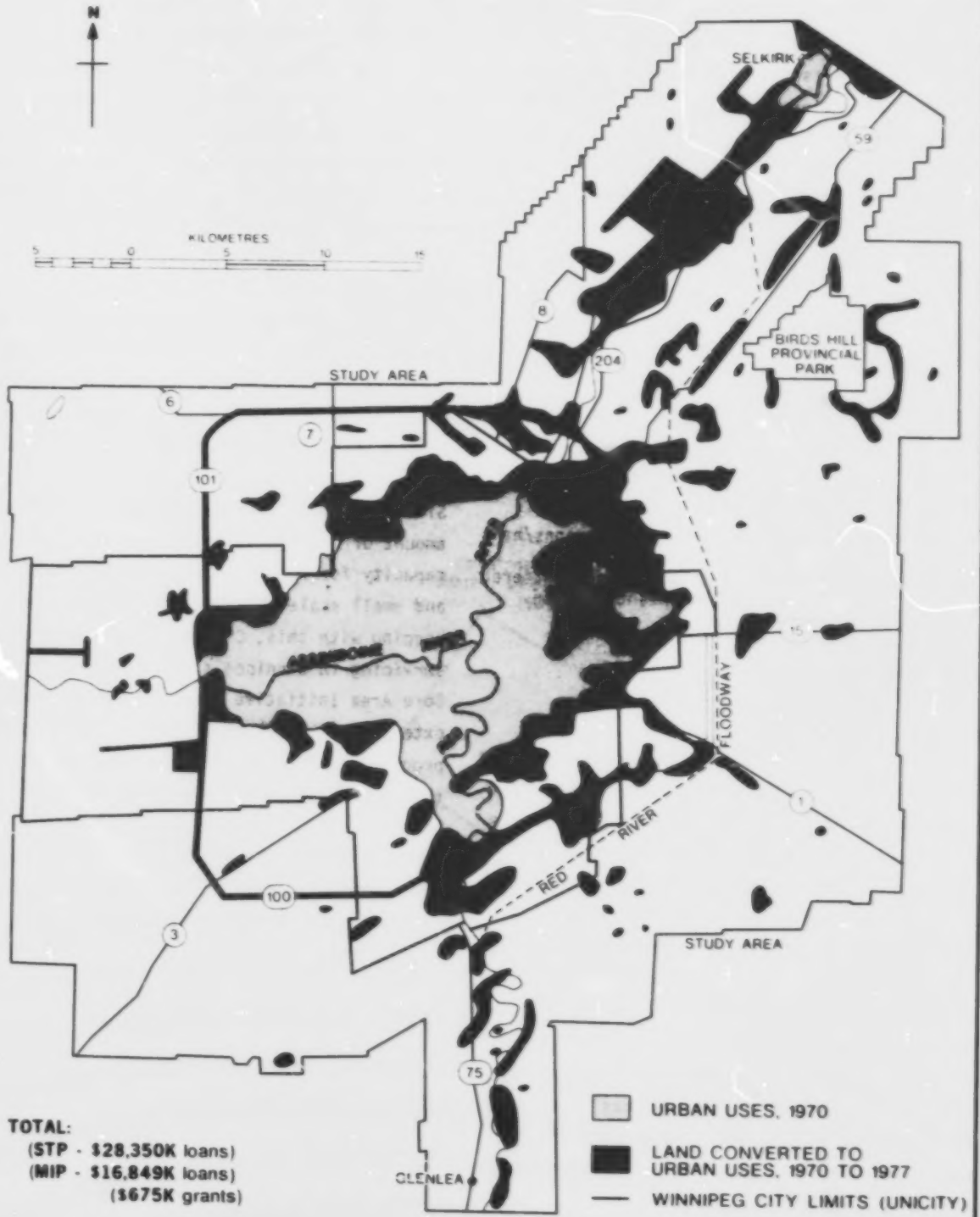
CMHC infrastructure assistance appears to have had a moderate, beneficial impact on land use in Winnipeg by encouraging compact urban development.

Case C: Regina

Population, 1976:	149,593
Population growth rate per annum, 1966 to 1976:	1.4%
Percent CLI agricultural capability Class 1 to 3 within 24 kilometre (15 mile) radius:	86.3%

[a] A hectare is equivalent to 2.471 acres.

FIGURE 7.5: WINNIPEG (CASE B)



SOURCE: COMPILED FROM WARREN (1982), MAP 2

Area urbanized, 1966 to 1976:	1,544 ha
Percent area newly urbanized of CLI Class 1 to 3, 1966 to 1976:	97.6%
Growth density, 1966 1966 to 1976:	11.9 persons/ha
Type of development:	Planned, contiguous (Rump and Brennan, 1982).

STP - $3,600 K loans;
MIP - $ 761 K loans;
- $ 464 K grants.

Since the mid-1970s, Regina's growth strategy has been guided by principles in its development plan, Regina RSVP (City of Regina, 1977). This plan considered a number of "constraints" to urban development, including (Figure 7.6):

1) the location of industrial polluters and the relocated railway lines;

2) noise contours from the Regina airport;

3) the location of groundwater aquifers for water supply;

4) the location of flood hazard areas; and finally

5) the surrounding agricultural land, which is almost uniformly class 2.

This reinforced an historical pattern of little non-contiguous, scattered development, which continued at least through the 1968 to 1978 period (Rump and Brennan, 1982).

The city planned for long-term development (to the years 2010 to 2035) in two large sectors in the northwest (3,200 hectares) and southeast, both of which were close-in and contiguous to previous urban development (Figure 7.6). This strategy protected as much as possible the surrounding high capability agricultural land resource and tended to preserve the safety of the city's water supply, which is partially provided from groundwater aquifers. All MIP-funding was used for these two development areas which, although long-term in nature, were serviced fully at the beginning. Although higher density was planned for these areas, single-family dwellings have resulted due to local housing preferences. While these areas will not be sufficient to provide housing development sites for as long as originally planned (35 years), they appear likely to accommodate Regina's growth past the turn of the century. CMHC's infrastructure assistance has therefore assisted long-term planned development, but has been a comparatively minor factor in the resultant development.

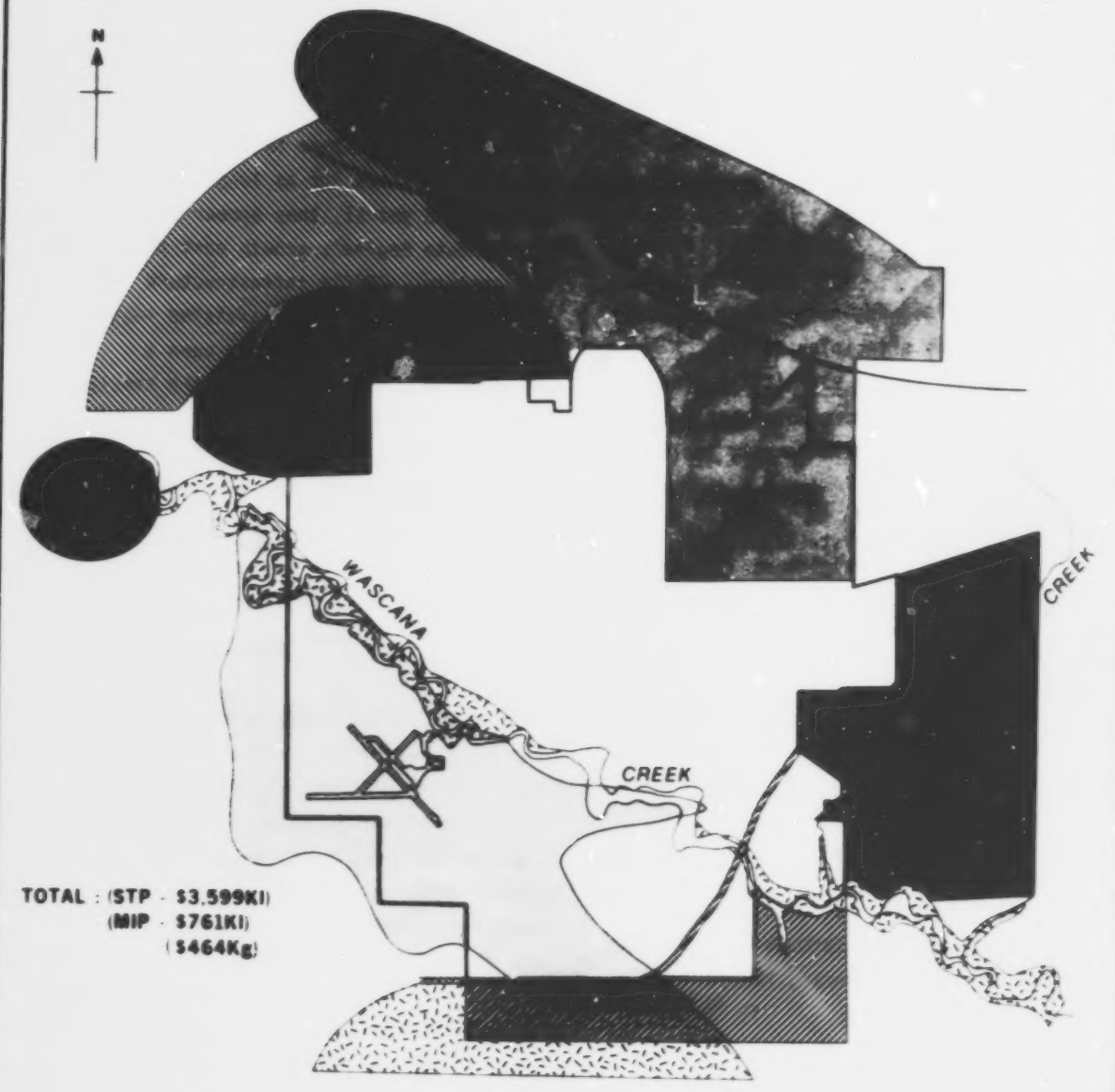
Case D: Kings County, Nova Scotia

Type of development:	Largely scattered rural residential.

STP - $1,280 K loans;
MIP - $4,805 K loans;
- $ 452 K grants.

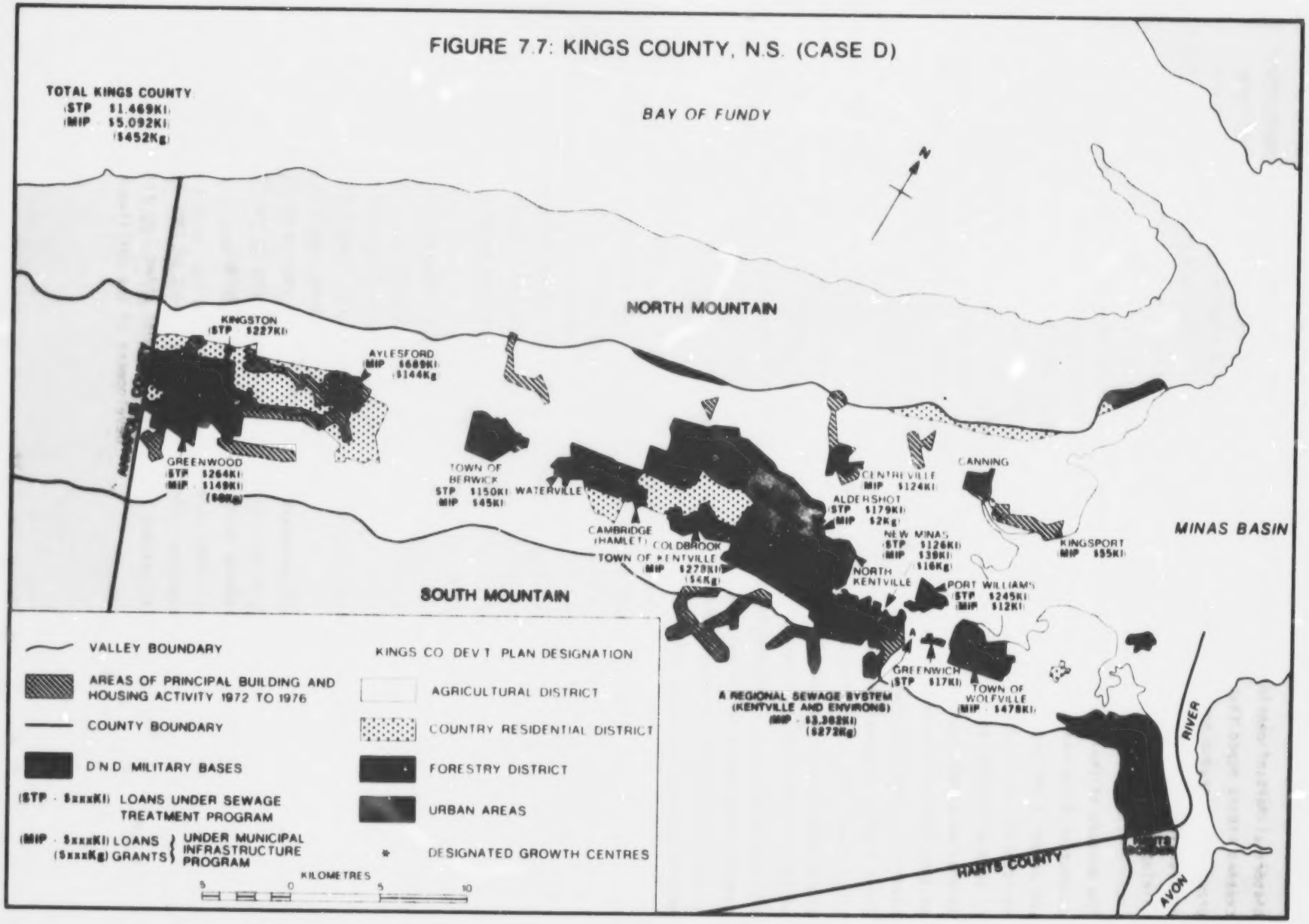
During the 1970s, Kings County was involved in the evolution of its innovative Development Plan (County of Kings, 1979), with exclusive agricultural and forestry districts, implemented in 1979 (Figure 7.7, adapted from County of Kings, 1979). The agricultural district is composed of all land generally of CLI agricultural capability classes 2 or 3. During this period, CMHC monies were used for sewage infrastructure for retrofit and infill housing in long-established communities (e.g., Aylesford- initial system), as well as in centres designated for growth (in 1973 in advance of the plan; e.g., Centreville- initial system). A major regional sewerage system, serving the Kentville-New Minas area was developed with MIP-funding of over $3.5 million (Figure 7.7). By providing for serviced growth at higher than local,

FIGURE 7.6: REGINA (CASE C)



SOURCE CITY OF REGINA (1977), MAPS 2 TO 9

FIGURE 7.7: KINGS COUNTY, N.S. (CASE D)



historical "urban" densities within the growth centres, it is hoped that they will absorb the growth which traditionally has been manifested as high levels of scattered rural residential development.

The success of the plan may be hampered by the severance policy which allows one severed lot per property per year, although new residential development is not to take place on land within the agricultural district. Several more years must pass before it will be possible to fairly assess the success of the plan in dealing with the inevitable pressures. The provision of sewerage in many older centres was viewed primarily as a strategy for protection of the local groundwater supply which, in cases such as Kingsport, was threatened by sewage contamination from septic tanks. Although it is acknowledged that provincial funds for municipal infrastructure were of primary influence, CMHC funds were, nevertheless, supportive of the local land-use planning exercise, which culminated in the development plan.

Case E: Chilliwack

Population, 1976:	21,746
Population growth rate, 1966 to 1976:	2.4%
Area urbanized, 1966 to 1976:	550 ha
Percent area newly urbanized of CLI agricultural capability Class 1 to 3, 1966 to 1976:	63.1%
Growth density, 1966 to 1976:	75 persons/ha
Types of development:	Contiguous, non-contiguous.

STP - $3,182 K loans;
MIP - $ 893 K loans;
- $ 53 K grants.

Chilliwack, located on the rich agricultural land of the Fraser Valley, had no official plan at the time of CMHC's infrastructure assistance. The current plan recognizes the importance of the surrounding agricultural land resource by avoiding development on lands designated under the Province's Agricultural Land Reserve (ALR; District of Chilliwack, 1983). CMHC infrastructure funding was used to service the only two remaining small, undeveloped areas which were outside of the ALR, immediately to the southeast and southwest of the city. These developments included some higher density housing, in the southwest area. The development of these areas provided the District with a breathing time in which to prepare for the shift of development south onto the upland areas of a nearby plateau in the Cascade Mountains (the "Promontory Areas") and to infill and redevelopment (District of Chilliwack, 1983).

In many cases individual Canadian urban centres have no option in expansion; they must consume high capability agricultural land if they are to grow at all. Other examples of this situation (from the sample alone) include Windsor, Niagara (St. Catharines), Lethbridge, Regina, Guelph, and Chatham.

It is arguable, however, that this further expansion at the current site of Chilliwack on the Fraser River floodplain was unwise due to the danger of the river overtopping or breaching the dyke system in a flood. The City is already restricted vis-à-vis many zoning changes, due to the Province's concern over this very danger.

In sum, the impact of CMHC infrastructure assistance has aided long-term logical development of the Chilliwack urban area.

7.3 CMHC Support of Mixed Impacts on Land Use: Case Studies

Case F: Windsor/Essex County

Population, 1976:	223,922
Population growth rate per annum, 1966 to 1976:	0.4%
Percentage CLI agricultural capability Class 1 to 3 within 24 kilometre (15 mile) radius:	90.8%
Area urbanized, 1966 to 1976:	2,069 ha
Percent area newly urbanized of CLI Class 1 to 3; 1966 to 1976	91.4%
Growth density, 1966 to 1976:	3.9 persons/ha
Types of development:	Infill, contiguous development, discontiguous suburbs, scattered rural residential development (Lands Directorate, 1983).

Essex County:
STP - $ 5,078 K loans;
MIP - $ 6,997 K loans;
- $ 2,111 K grants.

Windsor:
STP - $22,800 K loans;
MIP - $ 1,578 K loans;
- $ 516 K grants.

Windsor utilized CMHC STP monies, through the 1960s and early 1970s, largely to develop much of two major sewage treatment plants and the trunk sanitary sewer systems feeding them. The city tended to utilize funds under the later MIP for retrofit of storm drainage in existing residential areas and infill development (Areas A to C, Figure 7.8). In general, these services have supported urban growth by infill development (examples- Bellwood, St. Mary's Gate, and Hall Farm, Areas D to F) and by contiguous development (e.g. Forest Glade (Area G), the major subdivision development of the 1970s). These types of subdivisions, although predominately single-family and of lower densities, make more efficient use of the land resource than discontiguous suburban or scattered rural development- an important value, considering considering that the area is sited on some of Canada's finest agricultural land from both climatic and soils points of view.

The city has major possibilities for further infill development (which can be served easily by the now existing sewage facilities), due to several very large blocks of lands which have been prohibited from development to date by excessive land fragmentation, the result of unrewarded land speculation in the 1920s. CMHC has assisted the city in a feasibility project under the Bellwood Land Assembly Project (A, Figure 7.8) to assemble and market these lands. Depressed housing markets to date have interfered with the proper assessment of this land assembly project.

Unfortunately, the sewage plants described above also serve some less efficient (less contiguous, less logical) growth outside city boundaries in Sandwich South and Sandwich West townships (figures 7.8 and 7.9). Since there is no overall plan for or method of co-ordination of development of the urban area, these projects proceeded, despite the City's clear strategy for infill and contiguous development.

Although a planning capability and community plans now exist in the County, the rural areas outside Windsor (high quality agricultural land) have a legacy of scattered, strip, and nodal development. CMHC funding in the County was substantial, but appears to have mainly

FIGURE 7.8: WINDSOR (CASE F)

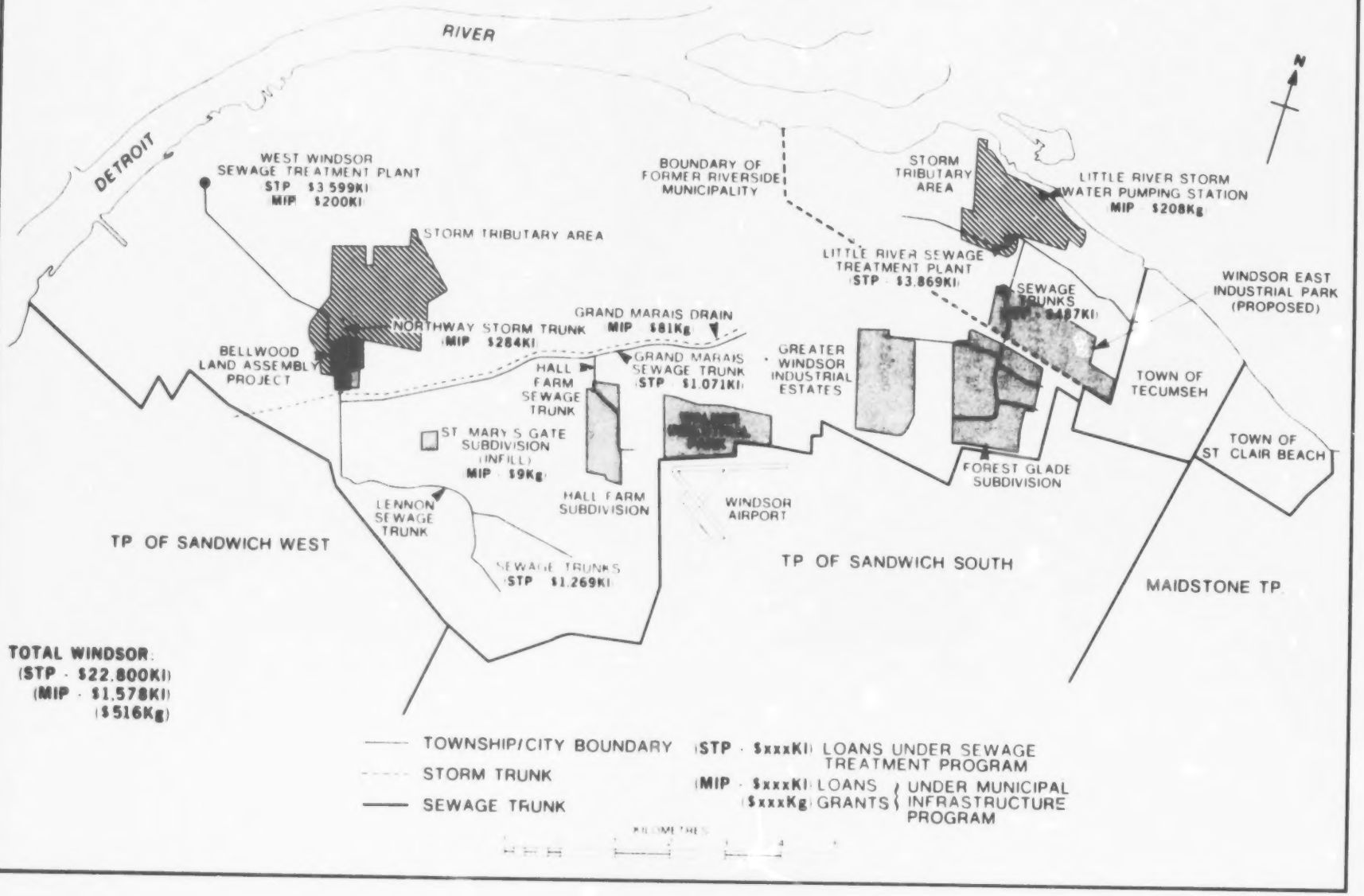
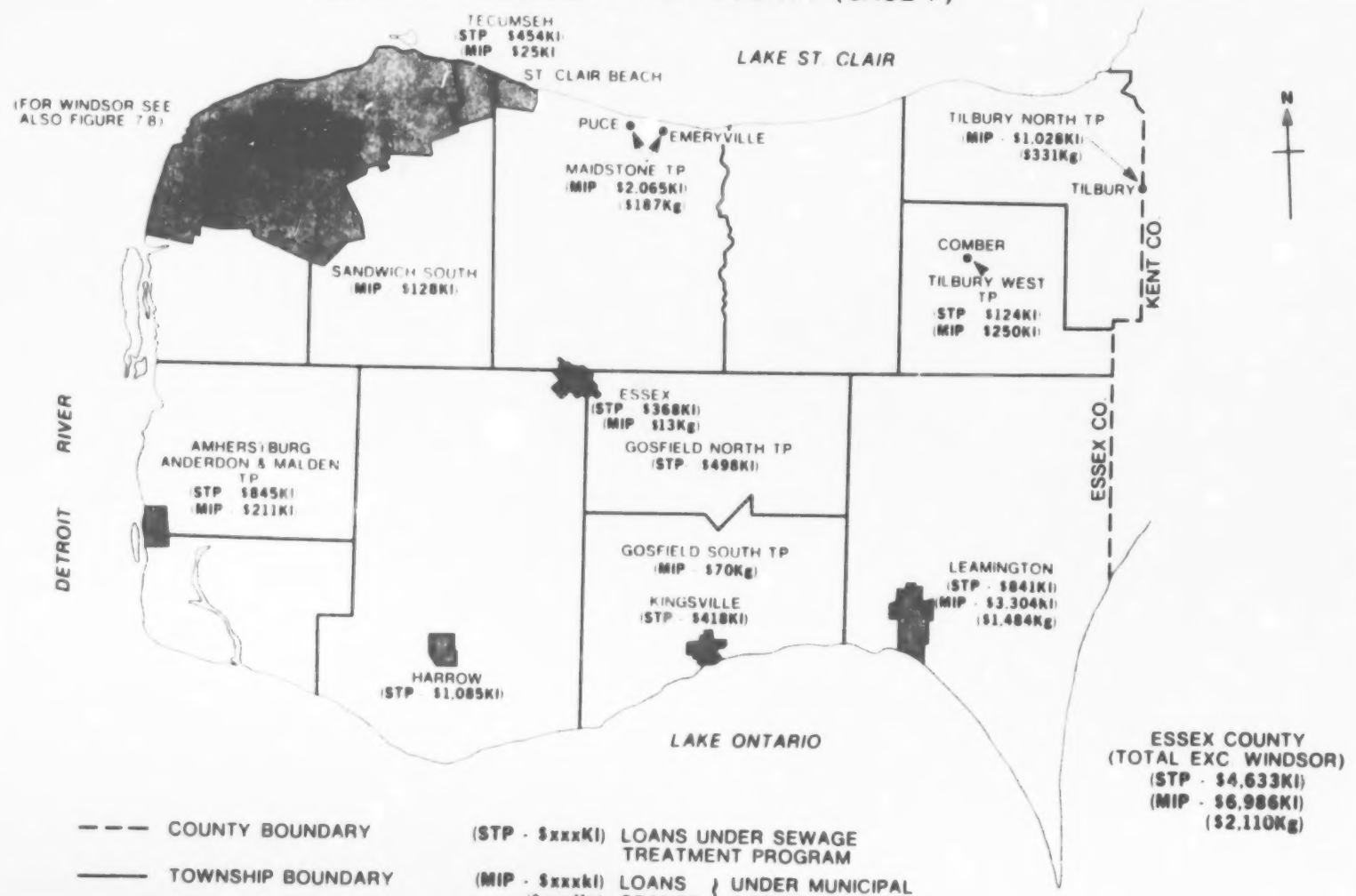


FIGURE 7.9: WINDSOR/ESSEX COUNTY (CASE F)



served to retrofit and allow expansion of the towns and villages, thereby encouraging concentration of the County's population, to the extent that infrastructure figures in this process.

Overall, CMHC municipal infrastructure programs in Windsor/Essex County appear to have had moderate leverage on land use, both to positive and negative ends.

Case G: Niagara Region (Rural Areas below the Escarpment)

Population, 1976:	295,860
Population growth rate per annum, 1966 to 1976:	1.1%
Percent CLI agricultural capability Class 1 to 3 with 24 kilometre (15 mile) radius (St. Catharines):	92.2%
Area urbanized, 1966 to 1976:	5,469 ha
Percent newly urbanized area of CLI class 1 to 3, 1966 to 1976:	81.4%
Growth density, 1966 to 1976:	5.3 persons/ha
Types of development:	Contiguous, extensive single-family subdivisions, both contiguous and discontiguous, as well as scattered rural residential (Krueger, 1978).

STP - $ 395 K loans;
MIP - $10,826 K grants;

The 1970s were a period of an intense, on-going controversy over the boundaries of urban areas in the portion of the Niagara Region below the Niagara Escarpment (Figure 7.10). The Ontario Municipal Board (OMB) and the provincial cabinet periodically indicated a keen interest in preserving these unique tender fruit areas from urban development. At the same time, the provincial Department of Environment aggresssively promoted and subsidized the servicing of these lands with sanitary trunk sewers, increasing urban development pressures on them manifold. By far, the major CMHC input was a $9.5 million loan for the Grimsby-Lincoln Sewage Treatment plant and associated trunk sewers. This system largely services lower density single-family subdivisions adjacent to the towns. Nevertheless, CMHC infrastructure funding played but a minor facilitating role, adding to the pressures for development of these fruitlands.

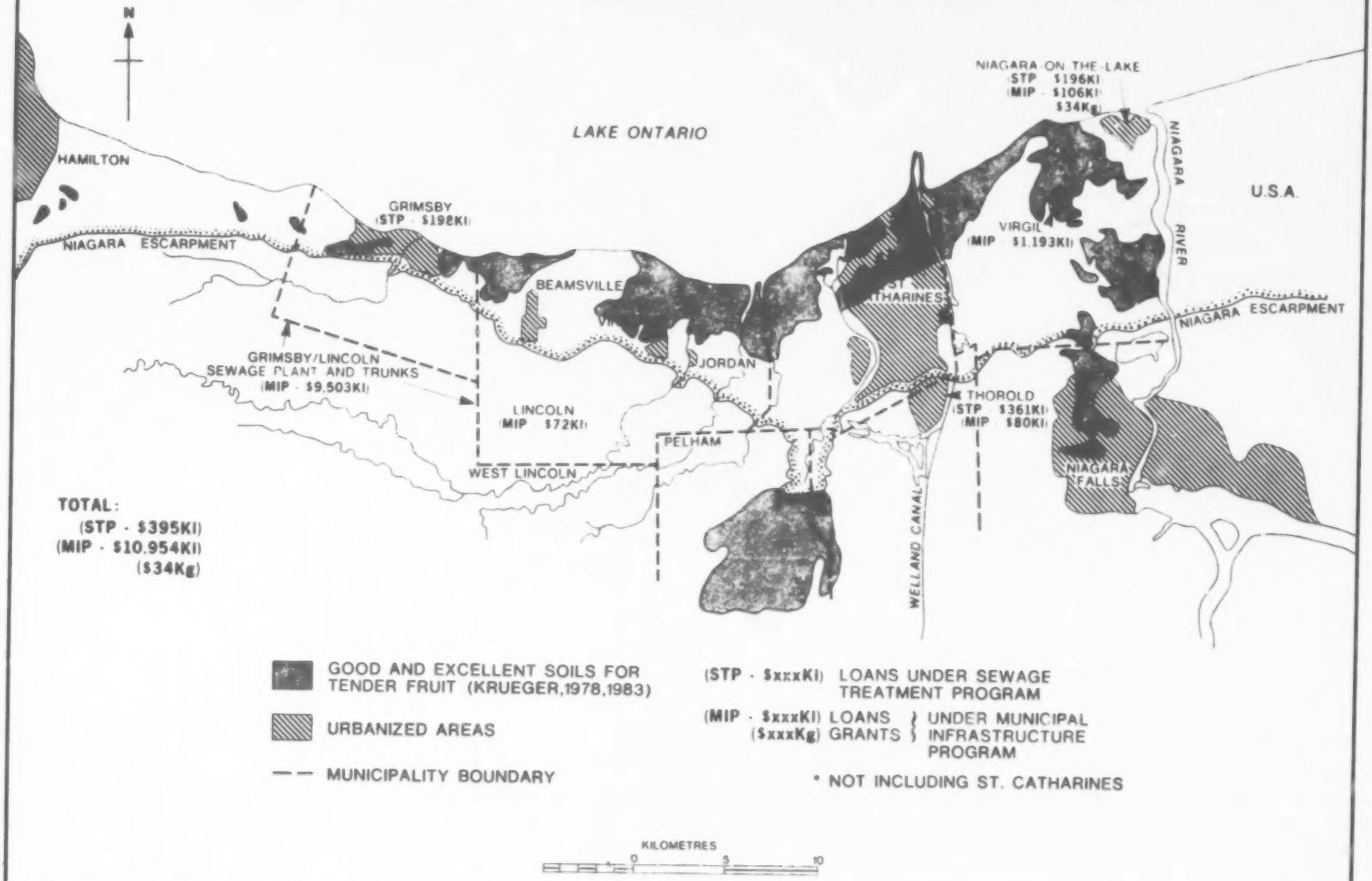
A final OMB decision in February, 1981 set compromise urban limits and established a strict rural severance policy for this region. If strictly followed, this decision should significantly limit future residential pressures on fruitland, thereby defusing the on-going rural development pressures to which over-serving of these lands has significantly contributed and limiting further the potential importance of CMHC infrastructure inputs.

Case H: Cape Breton County, N.S.

Population, 1976:	
Sydney	76,699
Sydney Mines	22,296
Population growth rate per annum, 1966 to 1976:	
Sydney	-0.2%
Sydney Mines	-0.2%
Sydney and Sydney Mines, 1966 to 1976:	
Area urbanized:	762 ha
Percent newly urbanized area of CLI agricultural capability Class 1 to 3:	79.9%
Growth density, 1966 to 1976:	Negative
Types of development:	Contiguous, scattered, nodal.

STP - $1,363 K loans;
MIP - $ 778 K loans;
- $ 82 K grants.

FIGURE 7.10: NIAGARA - RURAL AREAS BELOW THE ESCARPMENT (CASE G*)



CMHC assistance in Cape Breton County has supported a variety of types of development in the County (Figure 7.11). It aided provision of trunk sewers for Cantley Village ("A" on Figure 7.11), an example of a major unplanned, uncontrolled, non-contiguous development about 6 kilometres from the Sydney urban area. This particular assistance supported a trend in the seventies in the county to increased growth in the smaller, low-density villages and other scattered locations (where it is not possible, by and large, to provide piped services) at the expense of the larger communities, which are losing population. Generally, these developments are not taking place on quality agricultural land; the area is mostly of low to moderate capability for agriculture. Little good land is located near the villages and towns. As a consequence, the area is predominantly one of agricultural abandonment.

Cantley Village represents an example of CMHC assisted servicing which responded to such development, rather than directing it. On the other hand, retrofit trunk sewerage (for existing neighbourhoods) was funded by CMHC in both Glace Bay and Sydney. In Sydney River, a new planned subdivision contiguous to previous urban development in Sydney also received funds. While there is a sewerage plan for the County (also financially supported by the MIP), only the towns and cities are in compliance.

Although the sewerage systems allow for treatment of effluent, there is none; it is not a local priority. The sewage largely outfalls into Sydney Harbour (i.e. the ocean). While there was once a beach near the outfall, it is likely it would have been shut down regardless, due to other sources of pollution in the harbour.

The County has not been able to approve an official plan largely due to the local perception that planning is not a useful thing. In this context, CMHC funding in sum has contributed to a mix of positive and negative land-use results vis-à-vis the nature of urban development and the effective utilisation of the rural land resource. Nevertheless, the Province was the primary funding agency for infrastructure. In addition, infrastructure generally follows rather than precedes development in this area. Therefore, it is difficult to lay any portion of the blame (or praise) on the MIP for the result.

Case I: Goulds (St. John's)

St. John's:

Population, 1976:	129,042
Population growth rate per annum, 1966 to 1976:	4.0%
Percentage CLI agricultural capability Class 1 to 3 within 24 kilometre (15 mile) radius:	1.2%
Area urbanized, 1966 to 1976:	1,359 ha
Percentage of newly urbanized area CLI Class 1 to 3, 1966 to 1976:	0.3%

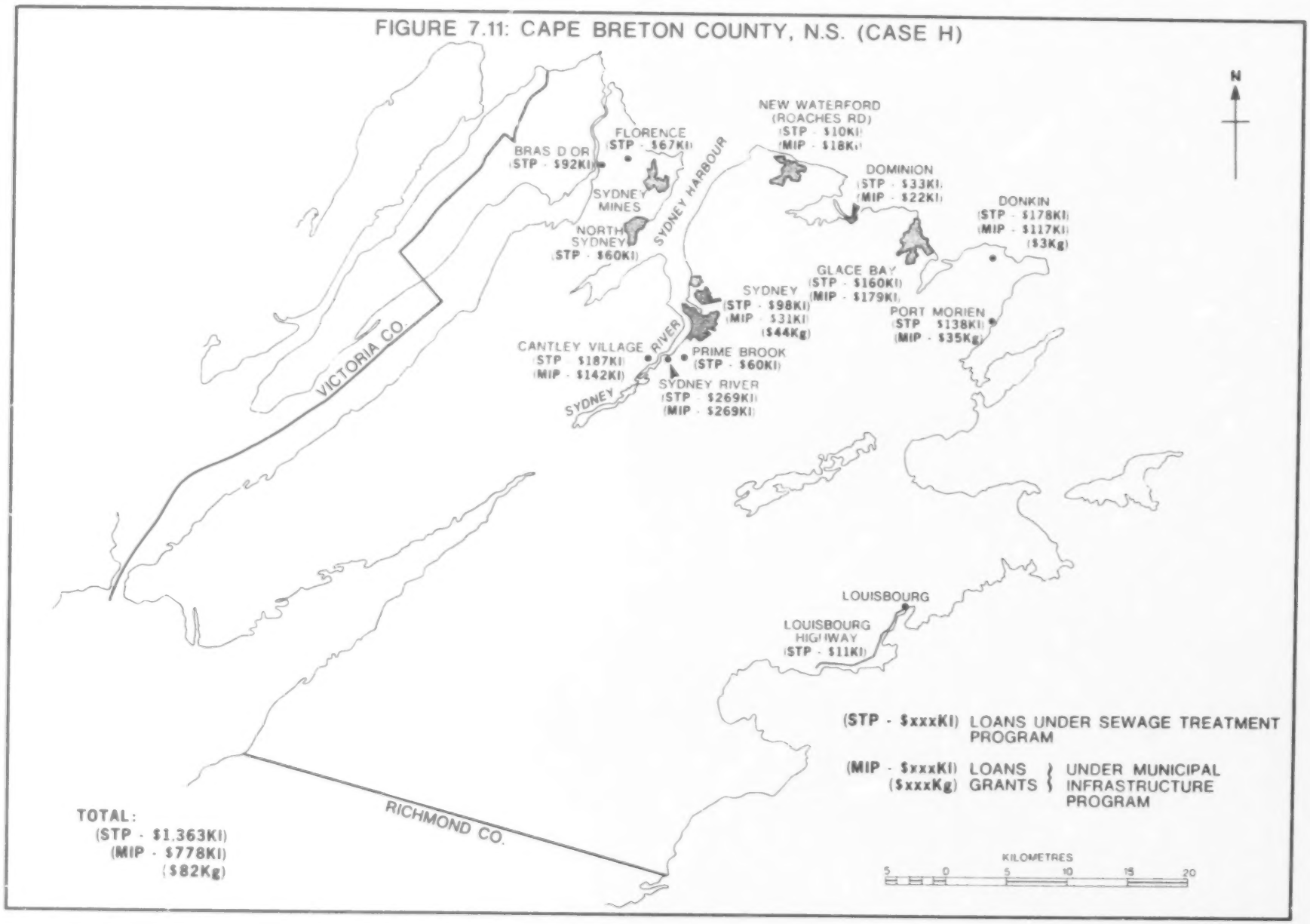
Growth density, 1966 to 1976: 3.5 persons/ha

Types of development: Contiguous, scattered rural residential (Wilson, 1983).

St. John's (City):
STP - $ 3,495 K loans;
MIP - $13,303 K loans.

St. John's (Metro, not inc. City):
STP - $ 262 K loans;
MIP - $ 2,136 K loans.

FIGURE 7.11: CAPE BRETON COUNTY, N.S. (CASE H)



Goulds is a fast growing low-density community of about 4,200 people, ten kilometres southwest of St. John's, characterized by strip development. It is located on an area of Newfoundland's scarce agricultural land and St. John's valuable milkshed. CMHC subsidized tremendously over-sized services- a water main and sewer system both designed for 20,000 population through $214,000 and $70,000 MIP loans respectively. According to the project application, growth is supposed to be restricted by the province's agricultural land-use designation (designed to restrict development of the Province's very scarce supply of moderate capability farmland) and by CMHC (through mortgage insurance). Nevertheless, these infrastructure elements place obvious urbanizing pressure on this limited supply of agricultural land in the middle of sprawling, discontinuous residential development.

Land within the agricultural zone has been developed and, after the fact, been removed from the zone both here and in nearby Conception Bay South. While the provincial government makes most ultimate servicing decisions in Newfoundland and finances much of the Province's infrastructure, CMHC infrastructure assistance funds have clearly contributed to the pattern of scattered low-density development and the consumption of limited agricultural land in this designated area.

Case J: Sherbrooke

Population, 1976:	94,691
Population growth rate per annum, 1966 to 1976:	1.9%
Area urbanized, 1966 to 1976:	700 ha
Percent newly urbanized area of CLI agricultural capability Classes 1 to 3, 1966 to 1976:	20.7%
Growth density, 1966 to 1976:	21.5 persons/ha

Types of development: Contiguous, scattered.

STP - $ 262 K loans;
MIP - $1,539 K loans.

At Sherbrooke, CMHC funds have been used exclusively for small, new subdivisions outside the core municipality of Sherbrooke, which is largely urbanized, in the surrounding suburban municipalities of Fleurimont, Rock Forest, Ascot, and Lennoxville (Figure 7.12). In Rock Forest, an urbanizing fringe municipality, almost one-half million dollars in loans were extended under the MIP for servicing in areas #1 to #3 (on the map); these were at considerable distance to the city centre, although two of them were contiguous to previous development.

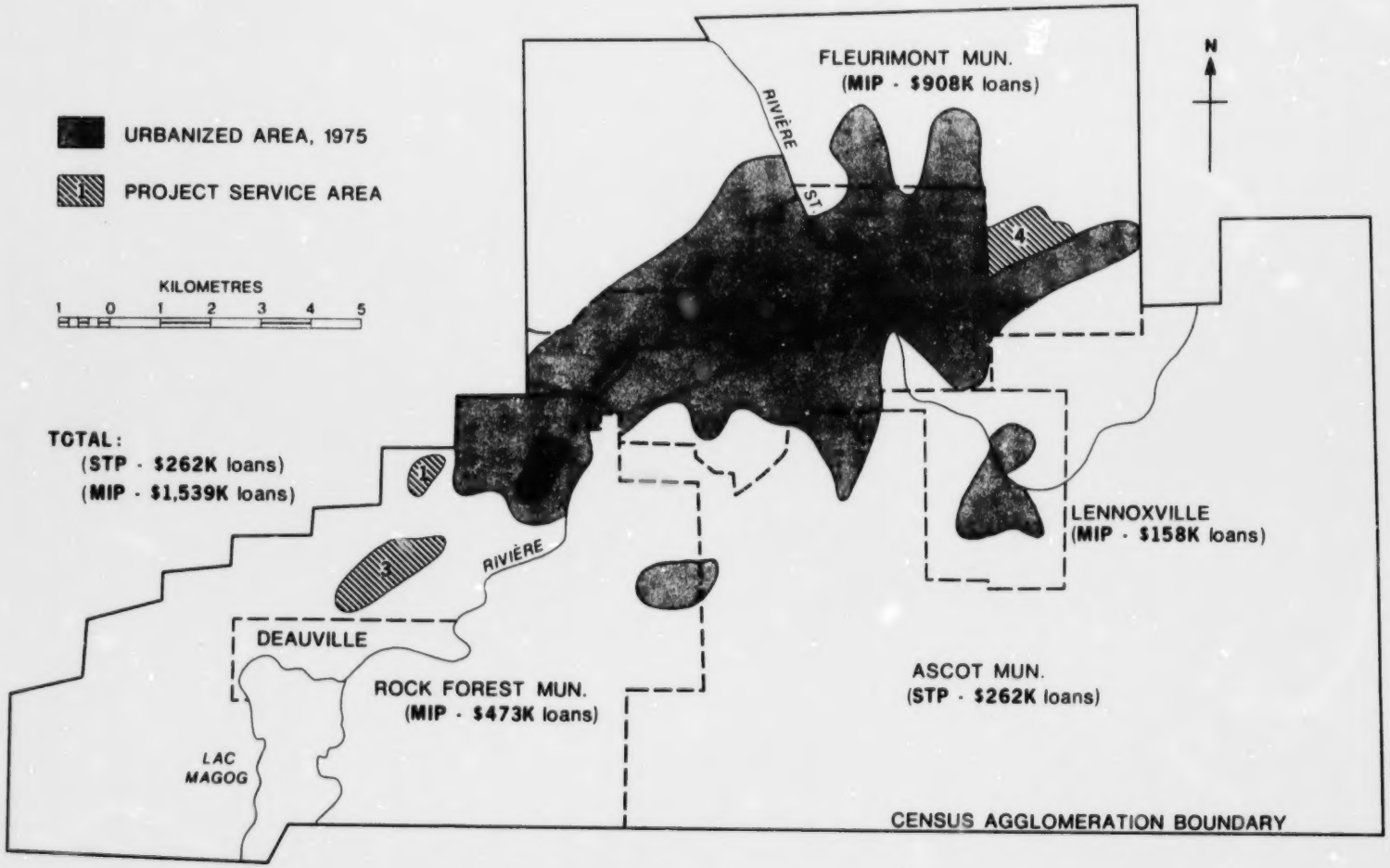
In large part, developers shape urban development at Sherbrooke; the area does not have an overall growth strategy. Although the rural land resource is not of high quality for agriculture, this situation nevertheless constitutes encouragement of a dispersed, low-density urban form, with its associated higher costs for both above and below ground services. CMHC, by putting infrastructure assistance into these projects, may have tended to compound the problems caused by the lack of effective local land planning. (This demonstrates the need for a planning criteria in infrastructure funding programs of this type.)

7.4 Montréal: Case Study

Case K, Montréal, including the Communauté Urbaine de Montréal (CUM), Pierrefonds (part of the CUM), Laval, and Châteauguay:

Population, 1976:	2,801,262
Population growth rate per annum, 1966 to 1976:	1.0%

FIGURE 7.12: SHERBROOKE (CASE K)



Percent CLI agricultural capability classes 1 to 3 within 24 kilometres (15 mile) radius:	67.4%
Area urbanized, 1966 to 1976:	10,346 ha
Percent area newly urbanized of CLI Classes 1 to 3, 1966 to 1976:	74.1%
Growth density, 1966 to 1976:	24.7 persons/ha
Type of development:	Core depopulation, rapid suburbanization outside of the Island of Montréal.

STP -	Total	$ 59,275 K loans.
	CUM	$ 43,865 K loans.
	Pierrefonds	$ 713 K loans.
	Laval	$ 8,732 K loans.
	Châteauguay	$ 13 K loans.
MIP -	Total	$291,937 K loans; $ 5,708 K grants.
	CUM	$259,186 K loans; $ 2,726 K grants.
	Pierrefonds	$ 653 K loans; $ 119 K grants.
	Laval	$ 13,959 K loans; $ 722 K grants.
	Châteauguay	$ 437 K loans; $ 60 K grants.

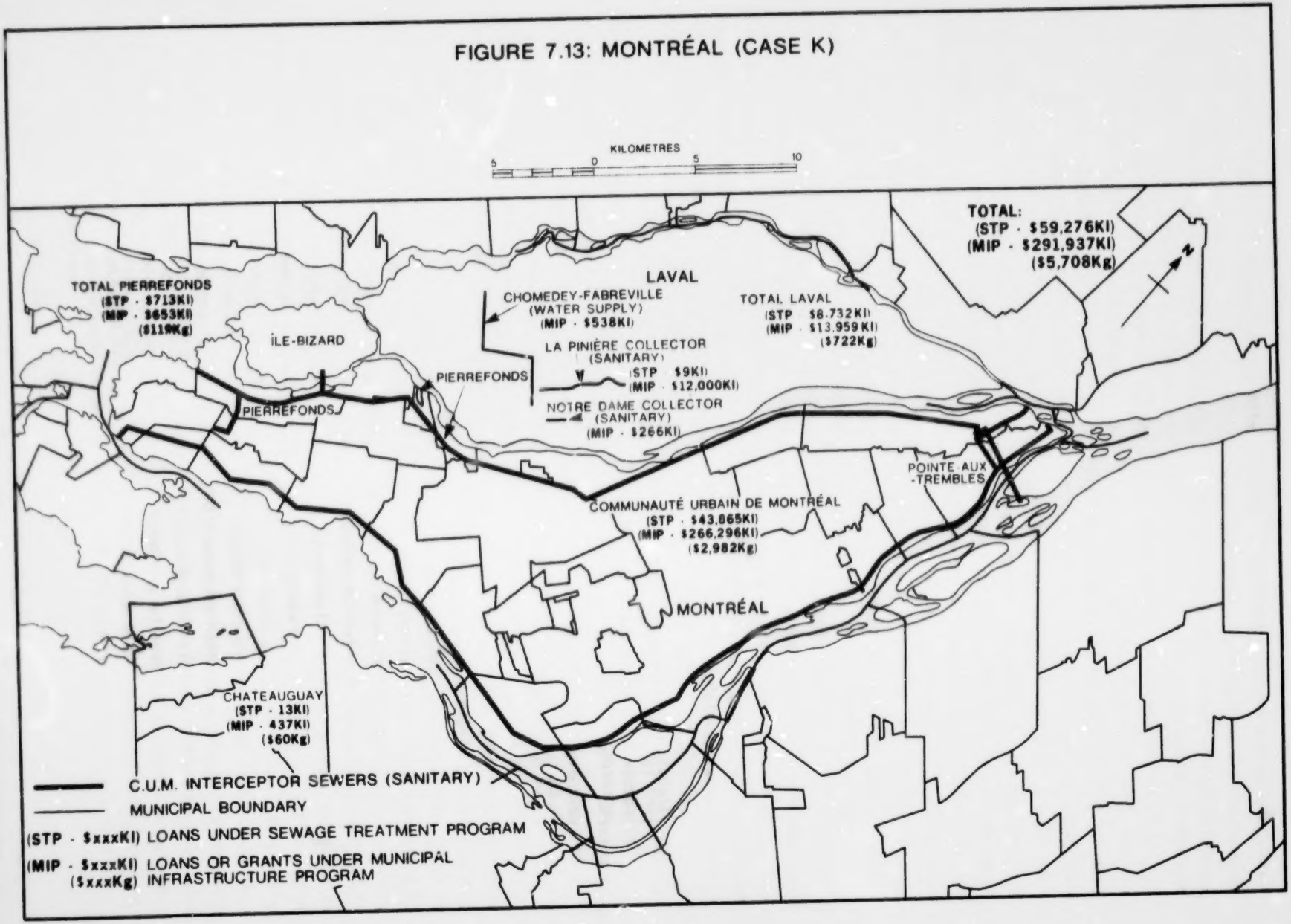
The recent demographic history of the Montréal urban region has been mainly characterized by slow overall growth and massive population shifts. Between 1971 and 1981, the population of the oldest part of the region, the City of Montréal, declined by almost 250,000 (Figure 7.13). While the remainder of the Communauté Urbaine de Montréal (the islands of Montreal and Bizard) experienced a minor population increase in the eastern and western sections (e.g. Pierrefonds, Pointe-aux-Trembles), the outlying suburban areas such as Laval absorbed substantial population increases.

The CMHC provided funding to support projects of the Sewage Master Plan, prepared in 1973 by the CUM as one of its first acts. This plan involved two interceptor sewers serving the north and south drainage areas of the island (north actually completed in 1983; south due to be completed in 1988) as well as a single, massive sewage treatment facility (for 1985). Together these projects alone have received or have committed to them MIP loans for almost $240 million, or about one-quarter of the total of MIP loans (CUM, 1983). These loans the most substantial of any under these programs. (Similar assistance though was provided to the Communauté régionale de l'Outaouais (Hull - about $60 million for a regional sewerage system) and for that of the York-Durham system (north and east of Toronto; about $40 million). This type and scale of assistance will reinforce the aim of the CUM's Land Planning Service to meet the objective of creatively anticipating the demographic trends described above by developing employment and residential poles on the island, but outside the more densely settled urban core. In addition, to the extent that sewerage infrastructure can, it encourages growth on the island rather than in the surrounding burgeoning suburbs, thereby promoting a somewhat more compact overall urban form.

At Pierrefonds, at the northwest end of the island (Figure 7.13), CMHC infrastructure loans ($1.4 million) assisted higher density development, contiguous to the existing urban centre, in an area of relatively lower density housing. Pierrefonds is surrounded by agriculture, now in Quebec's green zone lands- protected under Bill 90, that province's agricultural land protection legislation.

On the other hand, outer suburban development has also been funded; Laval, for example, has received over $24 million in CMHC infrastructure loans for infrastructure development, largely for sewage trunks. The examples of this funding were, however, generally for retrofit or contiguous, new development. Laval has expanded onto poorer

FIGURE 7.13: MONTRÉAL (CASE K)



land- land not now in the green zone. Laval's development can be clearly linked to the extensive highway system serving commuters to Montréal. In Châteauguay, an area surrounded by high-quality black soil (the best in Quebec), CMHC funding assisted storm sewers used to solve a flooding problem in an existing urban area, as well as to open up some new land previously subject to flooding for development. Châteauguay's sewage system is planned to be linked to the south drainage area interceptor sewer of the CUM when it is completed.

7.5 CMHC-Supported Infrastructure and Urban Development: Analysis

The framework of this research (see Figure 7.1) fully recognizes that two conditions are necessary to establish impact of a particular project on urban development

1) financial leverage: an influence by CMHC infrastructure funding on whether a particular project proceeds; and

2) on-the-ground leverage: an influence by that project on subsequent related urban development.

These two components of influence are focussed on in the analysis presented in the following section. Thereafter, the relationship of CMHC-assisted development to local land planning is investigated. Although it has not always been possible to do a full assessment of financial plus on-the-ground leverage, a judgement has been made in each case, nevertheless. Also, while the above case studies, on which these analyses are based, have generally included detailed assessment of only three to six MIP projects in a given centre/area, an effort was made to determine the range of CMHC infrastructure assistance within each centre.

1) The Question of Leverage

A summary by centre/area for the levels of overall leverage on infrastructure and urban development by the MIP projects analyzed by this research is contained in Table 7.1. Of the 22 centres/areas listed in the table, in only two was it judged that CMHC infrastructure monies resulted in substantial leverage on urban development (i.e. both significant financial leverage on infrastructure and significant on-the-ground leverage of assisted infrastructure on urban development). In Huron County, for example, CMHC assistance was critical to that County's development plan, which preserves high capability agricultural land (see Case A). Moderate impacts were found to have occurred in eight more centres/areas (i.e. one link or other was significant). In Windsor, CMHC monies were important to the City's ability to retrofit sewerage and provide services to infill and contiguous development in accordance with its development strategy. In the St. John's area, CMHC infrastructure assistance has tended to support the regional development plan; it is primarily a provincial decision regarding which infrastructure is funded in the St. John's region. In the remaining cases, CMHC infrastructure leverage was either of low importance or no significance whatever, due to the substantial level of provincial funding (e.g. Niagara- Case G, Kings County, N.S.- Case D), the lack of importance of piped services in development (e.g. Cape Breton County- Case H), the predominant influences of local/provincial land planning (e.g. Lethbridge, Chilliwack- Case E), or the requirement for developers to pay the bulk of servicing costs (e.g. Trois Rivières, Chilliwack).

2) Relationship to Local Development and Land Planning

What kinds of local development were assisted by CMHC infrastructure loans and grants? Table 7.2 provides a classification of centres both by the rate of increase in urban area from 1966 to 1976 and by the nature of urban development undergone by these centres. The survey has indicated that CMHC assistance went to the full gamut of types of development, from retrofit and infill to scattered rural development and nodal development.

A majority of the surveyed centres experienced, for the most part, "new, compact and/or contiguous development" (or will likely have done so when development catches up to provided infrastructure capacity).[a] In most of these cases (Kings County- Case D, Huron County- Case A, Windsor- Case F, Chatham, Regina- Case C, Guelph, Winnipeg- Case B, Chilliwack- Case E, Lethbridge), this pattern of growth reflected effective municipal control of development through local land planning, which tends to favour compact and contiguous urban form (Table 7.3). In the case of Chilliwack, the municipal plan has endorsed the provincially-designated Agricultural Land Reserves as limits for urban development.

Much of this development, despite being contiguous to existing urban areas, took place (and continues to do so) as relatively low-density, single-family subdivisions at the urban periphery (e.g. Regina- Case C, Guelph, Lethbridge). Only a few centres (Windsor- Case F, Chatham) were retrofit and infill predominant or important uses of CMHC funds. Nevertheless, with the exception of Chilliwack, the growth of each of the above-mentioned centres was efficient in terms of land use, with density of more than 10 additional persons per hectare newly urbanized hectare, 1966 to 1976 (Warren and Rump, 1981).

In two other cases, CMHC assistance went predominantly or wholely to contiguous development in centres which did not yet possess effective overall local plans or planning capabilities (Trois Rivières, Victoriaville). This suggests that by their very nature, piped services have tended to encourage contiguous growth. Both of these centres, however, generally experienced rapid areal growth at very low densities while showing very low population increases.

Five of the centres analyzed were assisted by the CMHC-subsidized projects to retrofit services and to provide for infill development. In Windsor (Case F), CMHC funding provided a substantial contribution to that city's development strategy. In Chatham, it was used to service for residential development parts of an abandoned sugar refinery complex surrounded by urban development. CMHC assistance to Kings County (Case D), assisted retrofit of urban services which encouraged higher than historical densities in the growth centres- centres which are a key component of their development plan.

In a number of centres, scattered as well as contiguous development was assisted by CMHC funds. At Goulds (Case I), a scattered, rural residential area received substantial overservicing, which may cause development to occur on the scarce agricultural land which

---

[a] To some extent, the frequency of this result, 9 of 22 cases, may have been exaggerated by the very approach of this survey, centres with good planning capacities, as well as with effective control of urban development, were clearly more likely to have responded when planners were sought for interview.

TABLE 7.1:

CMHC FUNDING LEVERAGE

LEVEL OF LEVERAGE: Centre or Area Name	Funding[a]	Explanation
HIGH:		
Huron County, Ontario	STP - $ 858 K l[a] MIP - $ 1,540 K l - $ 78 K g[a]	STP and MIP funding has been critical element in the success of their innovative Development Plan (see Case A).
Montreal- Pierrefonds	STP - $ 713 K l MIP - $ 653 K l $ 119 K g	MIP funding made possible a single high density development in his area of predominately low density residential development (Case K).
MODERATE:		
Windsor- City	STP - $22,800 K l MIP - $ 1,578 K l $ 516 K g	STP and MIP funding supported Windsor's development strategy by assisting servicing for retrofit and contiguous planned development as well as infill (see Case B). However, less desirable development outside of city boundaries was also assisted in this area of very high capability agricultural land.
- Essex County	STP - $ 5,078 K l $ 6,987 K l $ 2,111 K g	
Winnipeg	STP - $28,350 K l MIP - $16,849 K l 675 K g	Assisted servicing of planned, contiguous development within city boundaries. The supply of serviced land there enabled pressures for scattered developments to be resisted. Storm drainage was sometimes a vital input to these developments; i.e. without it they could not proceed. Nevertheless, suburban development predominated, while the core deteriorated: the latter has much open space/infill potential. (Case B, re Core Area Initiative Program.)
St. John's	City: STP - $ 3,495 K l MIP - $13,303 K l St. John's Metro Area: STP - $ 262 K l MIP - $ 2,136 K l	A centralized (provincial) decision-making process applies to infrastructure provision around this centre. The regional development plan (although not always adhered to by local communities) has been supported by MIP funding of infrastructure, whether intentionally or incidentally. The Province pays for most of capital and operating costs of sewage infrastructure in the Metro Area.
Sherbrooke	STP - $ 262 K l MIP - $ 1,539 K l	MIP funding allowed surrounding suburban municipalities, such as Rock Forest, to carry out a variety of servicing they would not likely have been able to do otherwise at that time. This may have tended to encourage development there, as opposed to in the central city.
Montreal- Communauté Urbaine	STP - $23,451 K l MIP -$266,296 K l $ 2,726 K g	The CUM's sewerage system has received massive assistance from the MIP. This system may encourage more compact future development on the island and also may favour settlement there as opposed to in the outlying suburbs- promoting somewhat greater density of the entire urban area (Case K).
Montréal- Laval	STP - $ 8,732 K l MIP - $13,959 K l $ 722 K g	The subsidized infrastructure tended to encourage continuous, compact, new development (Case K).
Montréal- Chateauguay	STP - $ 13 K l MIP - $ 437 K l $ 60 K g	Largely serviced retrofit, although one area was opened up for development by storm drains. This encouragement was both to a suburban area and one surrounded by high quality, black soil resources. Chateauguay, however, is not a growing area (Case K).
Hull (Communauté Régionale de l'Outaouais- CRO)	STP - $17,526 K l MIP - $60,549 K l $ 1,917 K g	Massive CMHC infrastructure funding was used for initial establishment of regional interceptor sewers and sewage treatment for retrofit and new, contiguous development according to CRO planning. The region's land-use plans came into effect in 1977 thus controlling subsequent development. Existence of sewerage system may tend to encourage more compact development.

[a] K = thousands; l = loans; g = grants.

LEVEL OF LEVERAGE: Centre or Area Name	Funding[a]	Explanation
LOW:		
Provincial funding of infrastructure was by far a more important influence on urban development in the following centres:		
Kings County, Nova Scotia	STP - $ 1,280 K l[a] MIP - $ 4,805 K l $ 452 K g[a]	In the case of Kings County, infrastructure assistance by STP and MIP and the Province has provided a possibly critical advantage in the success of their recently implemented Development Plan (see Case D).
Chilliwack	STP - $ 3,182 K l MIP - $ 893 K l $ 53 K g	In Chilliwack, CMHC assisted development of the last contiguous areas outside of the Agricultural Land Reserve. Since city policy demands developers pay and develop all services, even trunk sanitary, little leverage can be surmised. These areas, like the rest of the city, are unfortunately subject to flood risk (Case E).
Victoria	STP - $ 3,233 K l MIP - $ 5,164 K l $ 337 K g	BC's assistance for infrastructure completely overshadowed that of CMHC in the Victoria case.
Niagara Region	STP - $ 395 K l MIP - $10,826 K l	Aggressive servicing of rural areas below the escarpment in the Niagara Region by provincial environmental authorities contributed to the substantial development pressures on Canada's best fruitland in the late 1960s and early 1970s. STP and MIP funding were only minor, complicating actors in this situation though (see Case G).
Municipal planning was the key determinant of development in the following centres, although CMHC assistance aided implementation:		
Lethbridge	STP - $ 3,287 K l MIP - $ 112 K g	Lethbridge proceeded in a planned, phased manner; the City is its own major developer.
Regina	STP - $ 3,600 K l MIP - $ 761 K l $ 464 K g	Regina developed according to Regina RSVP (City of Regina, 1977), its development strategy, and made relatively low use of MIP funds (Case C).
Guelph	STP - $ 1,978 K l MIP - $ 354 K l $ 918 K g	Guelph grew in planned, contiguous subdivisions.
NO LEVERAGE:		
Chatham	STP - $ 2,733 K l MIP - $ 270 K g	Chatham city policy is that developers must pay all services, even trunk sanitary.
Trois Rivières	STP - Nil MIP - $ 1,380 K l	In Quebec municipalities, the developer is required to pay 80% servicing costs. CMHC funding has not been an influence on land use as a result.
Victoriaville	STP - Nil MIP - $ 180 K g	
Cape Breton County, Nova Scotia	STP - $ 1,363 K l MIP - $ 778 K l $ 82 K g	While provincial (not federal) funding was an important influence on infrastructure in Cape Breton County, infrastructure is not seen as an important determinant of development there (Case H).

[a] K = thousands; l = loans; g = grants.

TABLE 7.2:

RATE OF URBAN GROWTH VERSUS TYPE OF URBAN DEVELOPMENT

Increase in Urban Land Area, 1966 to 1976	No. of Centres in Sample	Predominant Types of Urban Development (% Increase)			
		Retrofit or Infill	New, Compact or Contiguous Development	Mixed	Scattered, Spread Out Development
Primarily rural areas	N/A	Kings County, N.S. (Case D) Huron County, Ont. (Case A)			
Low (5.0 to 19.9%)	11	MONTRÉAL (Case F: 16.9%) - Communauté urbaine de Montréal; - Pierrefonds; - Châteauguay WINDSOR/ESSEX COUNTY (Case F: 18.6%): - Windsor		VICTORIA (15.8%) - Laval. SHERBROOKE (Case J: 17.3%) - Essex County.	
Medium (20.0 to 34.9%)	23	CHATHAM (24.3%) REGINA (Case C: 25.3%) GUELPH (28.5%) WINNIPEG (Case B: 31.2%)		GOULDS (St. John's: Case J: 27.0%)	
High (35.0%)	21	TROIS RIVIÈRES (35.2%) HULL (39.5%)	NIAGARA (Case G; St. Catharines; 38.9%) CHILLIWACK (Case E: (42.1%) LETHBRIDGE (61.0%) VICTORIAVILLE (64.6%)	CAPE BRETON COUNTY (Case H; Sydney/Sydney Mines; 39.3%)	
	55				

N/A- Not applicable.

SOURCE: Increase in urban area: Warren and Rump (1981).

TABLE 7.3:

POTENTIAL INFLUENCE OF CMHC MUNICIPAL INFRASTRUCTURE FUNDING ON LOCAL LAND PLANS/STRATEGIES

Nature of Local Policy	Relationship of CMHC Support to Land Plans/Strategies (additional persons per hectare urbanized, 1966 to 1976)[a]		
	Supported Land Plans/Strategies	Mixed or Unclear Effects	Hindered Plans/Strategies
Policies generally supported infill and/or contiguous development- minimized use of rural land.	Chilliwack (Case E; 7.5) Winnipeg (Case B; 10.6) Regina (Case C; 11.9) Lethbridge (13.9) Chatham (14.8) Guelph (20.6) Huron County, Ont. (Case A) Kings County, N.S. (Case D)	--	--
Mixed policies/plans or multiple jurisdictions.	--	St. John's (3.5) Windsor/Essex County (Case F; 3.9) Niagara (5.3) Sherbrooke (21.5) Montréal (Case K; potential future impacts; 24.7) Victoria (25.2) Hull (potential future impacts; 29.3)	--
Unsupportive or non-existent policies/plans or implementation.	--	Trois Rivières (1.7) Victoriaville (3.8) Goulds (St. John's; Case I) Cape Breton County, N.S. (Case H; Neg.)	--

[a] This measure of density of growth does not take into account use of land for non-residential purposes (e.g. industrial, highway). The actual period of measurement varied from centre to centre (prorated to 1966 to 1976).

SOURCE: Growth density calculated from Warren and Rump (1981).

surrounds the community. Infrastructure followed development at Cantley in Cape Breton County (Case H), a new subdivision in a rural area outside of Sydney. This aids and abets a local dispersed settlement pattern of small nodes and scattered rural residences.

In almost all cases, the presence, nature, and effectiveness of local land strategies and planning were found to he the key factor in determining the location and type of development. CMHC infrastructure monies tended to assist in implementation of effective local land-use planning (e.g. Huron County- Case A, Windsor- Case F). In cases where the land planning was mainly absent or where planning focussed on too narrow a geographic area (e.g. Sherbrooke- Case J, Cape Breton County- Case H), CMHC funding appears to have had questionnable land-use impacts of various kinds.

8. LAND-USE IMPACTS OF CMHC INFRASTRUCTURE FUNDING: CONCLUSIONS AND RECOMMENDATIONS

This research has sought to describe and comprehend the impact on urban growth and rural areas of CMHC infrastructure funding under the Sewage Treatment Program (STP), the Municipal Infrastructure Program (MIP), and the Community Services Contribution Program (CSCP) over the last two decades. The study has used case studies of individual urban centres and rural areas, based on planner interviews (building from individual projects), as well as extensive statistical analysis of CMHC project data and land consumption characteristics of urban centres, a review of background data and literature, and interviews with CMHC program personnel. These data sources have been used to examine the nature and extent of the linkage between funding and infrastructure and urban development.

8.1 Conclusions

1. Based on the literature review, funding of sanitary sewage treatment plants, sewage and water trunk sewers, and water supply has been employed effectively as one means (among many land planning instruments) by many governments at different levels for phasing urban development, for directing its location, for helping to determine the pattern of development (contiguous and compact versus linear or scattered nodes) and for facilitating the type of urban growth (infill or redevelopment within the city versus development on the periphery of urban areas).

2. Infrastructure construction has potential to consolidate urban development into a compact form.

3. CMHC infrastructure funding appears to have had financial leverage in terms of overall capital spending levels for infrastructure by municipalities across Canada in the late 60's and early 70's, but much less so before and after that period.

4. CMHC deadlines may have hurried some project applications by municipalities without giving them time for a full review of the land planning implications of projects. Although this observation was found in the literature review and noted by CMHC programs officials, no further evidence was found in the planner survey to support or refute it.

5. Administration of the CMHC infrastructure assistance programs initially was centralized, then gradually regionalized. This resulted in flexibility and responsiveness to regional conditions, but the loss of a national perspective regarding the requirements for local official plans to be in place.

6. CMHC approvals were based primarily on financial and engineering criteria. No land planning criteria existed, except for a requirement to have an official plan in place. According to CMHC planning officials, this latter criteria was not enforced due to perceived sensitivity to the infringement on provincial responsibilities for land-use planning. Also, other CMHC funding reviews (e.g. approval of subdivisions for mortgage insurance) may have taken these factors into account.

7. Under the MIP, CMHC shifted its objectives from pollution abatement, which often implied retrofit and urban re-development, to the twin objectives of pollution abatement and servicing land for new housing to support rapid urban settlement for

an enlarging urban population. The allocation of funds to servicing land for new urban development, rather than servicing for infill or redevelopment, was clearly favoured in the MIP objectives regulations.

8. Aside from a clear intention to stimulate new urban development under the MIP, the land planning impacts by the STP and MIP programs were largely as local plans and circumstances dictated, due to the lack of effective land planning criteria for project approvals.

9. CMHC infrastructure funding was found to be significantly related at the national level to the location and amount of urban settlement and capability and use of the surrounding rural land as follows:

i) Greater urbanization of rural land- funding was not found to have focussed disproportionately (compared to population) on large urban centres, but was rather focussed on those centres growing more land-efficiently;

ii) Demand-responsiveness- analysis was contradictory: funding was found to have focussed to some degree on those centres with the highest population growth rates, but was only proportional for those experiencing the greatest growth in urban area; and

iii) Land use and quality- funding was found to have focussed on centres in which a high proportion of the land urbanized was previously in improved agricultural use and both a high proportion and amount of the urbanized land were of high agricultural quality (CLI agricultural capability classes 1 to 3).

10. CMHC infrastructure assistance both facilitated servicing that encouraged new urban development on rural land and projects related to urban revitalization in existing areas. On the one hand, the large preponderance of infrastructure funding did go to projects servicing development in new or predominately new areas, as opposed to existing built up areas (retrofit). On the other, the financing of infrastructure development tended towards the more populous urban areas which generally grew more efficiently in terms of additional people housed per new area of land developed.

11. CMHC infrastructure funding was the critical element ensuring that specific sewerage projects and hence, urban development projects, proceeded in only a few of the case studies. Provincial funding or decision-making procedures (local and/or provincial) have been by far the key determinants of whether projects went ahead.

12. The nature and extent of the impact that CMHC sewerage funds exerted on the location and pattern of urban development was largely dependent on provincial and local planning strategies and controls. CMHC infrastructure assistance reinforced the wise use of land, where comprehensive and effective local planning strategy existed, supporting the revitalization of older neighbourhoods, new development in compact form (contiguous to the built-up area), and the location of development (insofar as feasible) on lower capability rural land. Conversely, in areas where there was little or no effective land planning or controls, or where land policies were not consistent with the objectives of compact urban form or minimization of the use of high capability farmland, then CMHC infrastructure programs tended to finance scattered urban settlement, and excessive urban development on rural resource lands, some of which were of high quality.

In only a small number of the urban centres investigated were CMHC infrastructure loans translated into significant land-use effects. Where effective local, regional, or provincial land-use controls or strategies existed, these

were far more important than CMHC moneys in determining the nature, scale, and location of urban land development. In some other cases, notably in British Columbia, Newfoundland, and Nova Scotia, provincial funding and regulation represented the major influence by infrastructure on land use. And in still other cases, for example smaller Quebec centres, low levels of CMHC assistance resulted in minimal land-use impact. Where influences by CMHC funding were found, they have included both critical assistance to good land planning (e.g., Huron County and Windsor) and mixed influences (e.g., Sherbrooke and Cape Breton County, NS).

In sum, CMHC programs that financed municipal infrastructure had both good and poor influences on Canadian land use. Examples of developments serviced with CMHC infrastructure assistance that were characterized by compact form, proximity to the existing urban centre and minimum use of high quality rural land are as easily found as CMHC-assisted projects that are marked by scatteration and undue development of good capability resource lands. The primary factors in determining the ultimate land-use impacts of CMHC assistance in specific urban centres have been the provincial and local land planning strategies and the availability of other funding.

8.2 Recommendations

In order to ensure that future federal infrastructure assistance to local areas helps, within the bounds of good urban design, to bring about urban development which avoids or makes frugal use of high capability agriculture, forest, and other rural lands, the following recommendations are offered:

1. Give equal or greater preference to servicing land for infill, redevelopment, and revitalization of inner city areas, as opposed to new development on the urban fringe;

2. Local and regional land plans and strategies should be required for funding approval;

3. Approval criteria should ensure that such plans contain policies that support compact urban development and protect high quality farmland insofar as feasible. The Guidelines of the Federal Policy on Land Use should be reviewed and utilized in the development of criteria and review of projects for approval (Canada/Government of Canada, 1981). Explicit consideration should be given to the relationship of any particular project to the local or regional land plans. The rapid advance of rural planning in counties and regional districts, especially since the mid-1970s would be accelerated and aided by the requirement for an overall plan which respects the land resource and promotes the logical phasing of development in urbanizing areas.

4. Detailed screening of projects should ensure that the local concerns about land planning pollution and engineering are taken into account, but should nevertheless guarantee that nationwide concerns under the Federal Policy on Land Use are taken into consideration.

5. In addition, more flexibility needs to be exercised in the program. The retrofit requirements of older and inner city areas should be eligible, indeed favoured. The use of a more integrated planning and servicing approach, as demonstrated by the Winnipeg example, is certainly required. Alternative

servicing technologies (e.g. Canwel) that can facilitiate development on rough terrain with low agricultural capability should be eligible for funding. There should be consideration of energy conservation factors and, in certain areas, the desirability of encouraging settlement in selected small urban centres on lower capability resource lands should be favoured elements of regulations and approval criteria in any new program of this nature.

While past experience has been mixed, federal urban infrastructure assistance can be regarded as a potentially positive instrument for reducing water pollution and for encouraging and facilitating contiguous, efficient, and compact urban development at an appropriate rate in locations that minimize the usage and disruption of high capability agricultural, forest, and other resource lands.

REFERENCES

Beattie, Kathleen G., Wayne K. Bond, and Edward W. Manning. 1981. The Agricultural Use of Marginal Lands: A Review and Bibliography. Working Paper No. 13, Lands Directorate, Environment Canada. Ottawa.

Bryant, C.R., L.H. Russwurm, and A.G. McLellan. 1982. The City's Countryside. Longman House. Harlow, Essex, England.

Canada. 1963. Municipal Development and Loan Act. Statutes of Canada. Chapter 13. Ottawa.

_____. 1970a. British North America Act, 1867. Revised Statutes of Canada. Ottawa.

_____. 1970b. National Housing Act, 1953. Revised Statutes of Canada. Chapter N-10. Ottawa.

Canada/Government of Canada. 1981. Federal Policy on Land Use. Ministry of Supply and Services. Ottawa.

Canada/Central Mortgage and Housing Corporation. 1961 and 1975. Guidelines and Procedures Manual. Volume: Municipal Infrastructure. Module: Part VIII Water and Sewage Projects. Ottawa.

_____ and Canada Mortgage and Housing Corporation. 1962-1983. Canadian Housing Statistics, 1961 to 1982. Statistical Services Division. Ottawa.

_____. 1971. NHA Policies and Programs for the 1970s, Vol. 6, Land and Infrastructure Policy. Ottawa.

_____. 1975. Municipal Infrastructure Program. Information Bulletin. Ottawa.

_____. 1976. Assistance for Water and Sewerage Projects. A Guide for Obtaining Financial Assistance Through CMHC under the National Housing Act. Ottawa.

_____. 1977. A Canadian Waste Management System, Canwel. Information publication. Ottawa.

Canada/Interdepartmental Task Force on Land Use Policy. 1980. Land Use in Canada. Lands Directorate, Environment Canada. Ottawa.

Canada Mortgage and Housing Corporation. 1979a. Final Report: Municipal Infrastructure Programs (Canada Mortgage and Housing Corporation, 1961-1978) National Housing Act. Land and Infrastructure Division. Ottawa.

_____. 1979b. Community Services Contribution Program. Information bulletin. Ottawa.

Canada/Statistics Canada. 1960-1982a. Local Government Finance, Revenue and Expenditure, Preliminary Estimates. Cat. No. 68-203. Ottawa.

_____. 1960-1982b. Local Government Finance, Revenue and Expenditure, Assets and Liabilities, Actual. Cat. No. 68-204. Ottawa.

City of Regina. 1977. Regina RSVP: A Planning Strategy for Regina. Planning Department. Regina.

Communauté urbaine de Montréal. 1980. L'eau richesse à protéger. Service de l'assainissement des eaux. Montréal.

_____. 1983. Progrès des études et des travaux d'épuration. Service de l'assainissement des eaux. Montréal.

County of Kings. 1979. Municipal Development Plan. Kentville, Nova Scotia.

Cross, Ian. 1981. "Community Services Contribution Program: Status Report." Policy Evaluation Division. CMHC. Ottawa.

District of Chilliwack. 1983. Official Community Plan. Chilliwack.

Foggin, Peter. 1972. "Urban Land Use Patterns: the Montréal Case." in Montréal Field Guide. ed. by Ludger Beauregard. Les Presses de l'Université de Montréal, Montréal, pp. 32-45.

Gray, E. et al. 1972. Planning for Agriculture in Southern Ontario. ARDA Report No. 7, Centre for Resources Development, University of Guelph. Guelph, Ontario.

Greenspan, D.B. 1978. Down to Earth, Vol. I, The Report of the Federal/Provincial Task Force on the Supply and Price of Serviced Residential Land.

Kerr, M. Anne. 1983. Total Land-Use Change in Urban-Centred Regions: Victoria, 1966 to 1976. Report No. 13, Lands Directorate, Environment Canada. Ottawa.

Kochar, C. 1981, 1984. Personal communication. CMHC. Ottawa.

Krueger, Ralph R. 1978. "Urbanization of the Niagara Fruit Belt." Canadian Geographer. 22: 3, 179-194.

Laitman, L., P.J. Reynolds, and D.M. Tate. 1971. "An Organizational and Financial Strategy for Federal Participation in a National Program for Municipal Waste Treatment." Interim unpublished report, Department of the Environment. Ottawa.

Lands Directorate. 1983. "Total Land-Use Change in Urban-Centred Regions: Windsor 1962-1976." Report No. 9, Canada Land Use Monitoring Program, unpublished draft report, Lands Directorate, Environment Canada. Ottawa.

Lorimer, James. 1976. "Housing and Land: Two Sides of the Story." City Magazine, Vol. 2, No. 2, 44-51.

Manning, E.W. and J.D. McCuaig. 1977. Agricultural Land and Urban Centres: An Overview of the Significance of Urban Centres to Canada's Quality Agricultural Land. CLI Report No. 11, Lands Directorate, Fisheries and Environment Canada. Ottawa.

Marr, G. 1982, 1983. Personal communication. Local Government Section, Statistics Canada. Ottawa.

Martin, Larry R.G. 1975. Land Use Dynamics on the Toronto Urban Fringe. Folio No. 3, Lands Directorate, Environment Canada. Ottawa.

McCuaig, James D. and Paul D. Bircham. 1981. "Assessing the Impact of Federal Government Programming on Land Use: A Beginning." Social Impact Assessment, Vol. 61/62, 3-7.

McRae, James D. 1980. The Influence of Exurbanite Settlement in Rural Areas: A Review of the Canadian Literature. Working Paper No. 3, Lands Directorate, Environment Canada. Ottawa.

_____. 1981. The Impact of Exurbanite Settlement in Rural Areas: A Case Study in the Ottawa-Montreal Axis. Working Paper No. 22, Lands Directorate, Environment Canada. Ottawa.

Neimanis, V.P. 1979. Canada's Cities and Their Surrounding Land Resource. CLI Report No. 15, Lands Directorate, Environment Canada. Ottawa.

Ontario Economic Council. 1973. Subject to Approval: A Review of Municipal Planning in Ontario. Toronto.

Ontario Ministry of Housing. 1976. Urban Development Standards: A Demonstration of the Potential for Reducing Costs. Land Planning Policy Branch. Toronto.

Parlour, J.W. and P. Keilhofer. 1973. Federal Funding of Sewerage Systems 1945-1972. Discussion Paper No. B.74.5, Ministry of State for Urban Affairs. Ottawa.

Real Estate Research Corporation. 1974. The Costs of Sprawl: Environmental and Economic Costs of Alternative Development Patterns at the Urban Fringe. Council on Environmental Quality. Washington, D.C.

Robinson, I.M. 1977. "Trends in Provincial Land Planning, Control and Management". Plan Canada. Vol. 17, No. 3, September-December, 166-183.

Rump, Paul C. and Robert Brennan. 1982. Total Land-Use Change in Urban-Centred Regions: Regina, 1968 to 1978, Report No. 3, Lands Directorate, Environment Canada. Ottawa.

Seaden, George. 1970. Municipal Sewerage Disposal: Trends, Problems, Solutions. Six volumes. CMHC. Ottawa.

Shimizu, R., P. Burns, D. Archambault, and R. Davy. 1975. Legislative Framework and Administrative Procedures in the Provision of Municipal Sewerage Facilities in Canada. Inland Waters Directorate, Environment Canada. Ottawa.

Spurr, Peter. 1976. Land and Urban Development: A Preliminary Study. Lorimer. Toronto.

Urban Systems Research and Engineering Council on Environmental Quality. 1976. The Growth Shapers: The Land Use Impacts of Infrastructure Investments. Washington, D.C.

Warren, C. Leigh. 1982. Total Land-Use Change in Urban-Centred Regions: Winnipeg, 1970-1977." Report No. 14, unpublished draft report, Canada Land Use Monitoring Program, Lands Directorate, Environment Canada. Ottawa.

_____ and Paul C. Rump. 1981. The Urbanization of Rural Land in Canada: 1966-1971 and 1971-1976. Land Use in Canada No. 20, Lands Directorate, Environment Canada. Ottawa.

White, Joseph. 1981. Personal communication. CMHC. Ottawa.

Williams, G.D.V. 1975. "An Agroclimatic Resource Index for Canada and Its Use in Describing Agricultural Land Losses." Prepared for the Science Council of Canada, Agriculture Canada. Ottawa.

Wilson, David A. 1983. Total Land-Use Change in Urban-Centred Regions: St. John's, 1966 to 1977. Report No. 11, Lands Directorate, Environment Canada. Ottawa.

PLANNERS' QUESTIONNAIRE:

CMHC MUNICIPAL INFRASTRUCTURE PROGRAMS: IMPACT ON LAND USE

NAME: _____ TELEPHONE: _____

POSITION/
MUNICIPALITY: 1) PRESENT: _____

_____ Since: _____

2) MOST RECENT: _____

_____ Years: _____

3) SECOND MOST RECENT: _____

_____ Years: _____

URBAN AREA TO WHICH THIS INTERVIEW REFERS: _____

MUNICIPALITY: _____

---

1) First of all, in general can you describe how your community has used the CMHC infrastructure funding since 1961?

2) Now focussing on the projects approved in 1975 to 1978 only (the MIP), lets talk about the projects one by one.

a. What type of project was it?

b. Where was it constructed? See map provided.

c. Was the project in a new development or one in an existing urban development at the time of funding? (If existing, go to h.).

d. To what use is that land currently being put?

e. If residential, what densities of housing have been constructed?

f. What percentage of the land in the new developments has been or will be developed in the next two years?

g. If it is not yet developed, why not?

h. If an already existing area, was there a major change in its land use related to this servicing?

Area	(a) Type of Project	(b) Location	(c) New or Existing	(d) Land Use	(e) Residential Density (per hectare)	(f) Percentage Developed	(g) Reason not Developed	(h) Major Change, if Existing
Area 1:								
Area 2:								
Area 3:								
Area 4:								

3) Did the availability of these CMHC loans and grants for infrastructure affect _____'s capital works program?

Yes |___| No |___| (Probe as below.)

If so, how?

a. For example, was the timing of any of the projects moved forward earlier than was needed?

Yes |___| No |___|

If so, explain.

b. Were larger projects built than otherwise might have been?

Yes |___| No |___|

If so, explain.

c. Were more dollars put into sewage and water projects (and less into other services) than might otherwise have occurred?

Yes |___| No |___|

If so, explain.

d. Was the location of servicing (and therefore the subsequent development) affected the ease of availability of CMHC funding?

Yes |___| No |___|

If so, explain.

4) Did CMHC's criteria and process for approval of infrastructure loans and grants (including availability of high cost grants and the technical requirements) affect the provision of infrastructure and/or development? HAVE EXAMPLE READY!

Yes |___| No |___|

If so, explain.

Probe for any of the following not mentioned:

			Explanation
Type of infrastructure (sanitary versus storm):	|___|	No |___|	_____
Timing/Scale of the Project:	|___|	No |___|	_____
Technology (gravity versus pumped) (high cost versus recycling):	|___|	|___|	_____ _____
New versus existing area:	|___|	No |___|	_____
Creation of and adherence to land-use plan and zoning by-laws (nature of rural land resource):	|___|	No |___|	_____
Density of new development:	|___|	No |___|	_____
Location and nature of new development:	|___|	No |___|	_____

5) Now I'd like to go over the same list with respect to how provincial money, criteria, and regulations affected the process of CMHC funding of infrastructure. Did provincial involvement influence each of these factors to a greater, lesser or similar extent that CMHC funding? Can you explain?

	Extent	Explanation
Type of infrastructure:	_____	_____
Timing/Scale of project:	_____	_____
Technology:	_____	_____
New versus existing area:	_____	_____
Creation of and adherence to land-use plan and zoning by-laws:	_____	_____
Density of new development:	_____	_____
Location and nature of new development:	_____	_____

6) (Optional: Case Study):

Can you focus now on one particular project? (Choose one in consultation). Can you discuss what the specific effects are for it in terms of each of these factors?

	Extent	Explanation
Type of infrastructure:	_____	_____
Timing/Scale of project:	_____	_____
Technology:	_____	_____
New versus existing area:	_____	_____
Creation of and adherence to land-use plan and zoning by-laws:	_____	_____
Density of new development:	_____	_____
Location and nature of new development:	_____	_____

7) Do you feel that areas were serviced in your municipality or urban area with CMHC infrastructure funding that should not have been?

Yes |___| No |___|

If yes, why do you feel this way?

8) a. If a program such as this were introduced again, how could it be set up better to positively affect municipal development and promote sound land-use planning?

b. What changes have taken place since 1976 which should be considered in a new program of this type?

APPENDIX B: THE NATURE OF CMHC-SUBSIDIZED DEVELOPMENT

Centre/Area (Urban Population of CMA, 1976)	CMHC Funding[a]	Infrastructure Assisted	Nature of Subsidized Development (MIP Only)	Land Planning Context
ATLANTIC:				
St. John's, Nfld.: (129,042)				
- St. John's	STP- $ 3,459 K l[a] MIP- $13,303 K l	- St. John's- - sanitary trunk sewers; - regional water supply system.	- St. John's- - aided contiguous planned development - airport in n.e. is serviced by sanitary trunk.	- St. John's- supported planned development thrusts of this fast-growing centre south-west towards Mount Pearl (Waterford Valley), north-west to airport, and north-east (see Wilson, 1983).
- Metro Area (Case I)	STP- $ 262 K l MIP- $ 2,136 K l	- Goulds- - watermain.	- Goulds- - rural single-family subdivisons.	- Goulds- rural planning is mainly reactive due to nature of the local economy. - projects are often provincial initiatives because Province funds infrastructure and has ultimate decision-making authority. - located in St. John's Metropolitan Area (rural resource lands with pockets of urban development (350 sq. miles). - regional plan exists, but there is no enforcement. - Goulds urban development (usually strip) is forcing out agriculture (dairying); subdivision development occurring more recently is using land resource somewhat more efficiently- services may encourage more compact development. - there is a history of urbanisation of scarce agricultural zone land, followed by redesignation in this area.
Cape Breton County, Nova Scotia (Sydney- 76,999; Sydney Mines- 22,296; Case H)	STP- $ 1,363 K l MIP- $ 778 K l - $ 452 K g[a]	- sewage trunks both new and retrofit.	- variety of development aided, including: - major example of unplanned, uncontrolled, non-contiguous development- Cantley Village; - retrofit in Glace Bay and Sydney; - planned, contiguous subdivision in Sydney River.	- the County has not been able to approve an official plan; planning is not perceived as an useful tool there. - no displacement of agricultural land; little is near the towns and it is an area of abandonment and disintensification overall. - allowed sewerage systems provide for, but do not implement, treatment; it is not a local priority; sewage outfalls into the Sydney River/Sydney Harbour, i.e., the ocean. - there was once a beach near the outfall, but it is doubtful if swimming would be possible regardless, due to other sources of pollution in the Harbour.
Kings County, Nova Scotia (Case D)	STP- $ 1,469 K l MIP- $ 5,092 K l - $ 452 K g	- much initial sewerage including the regional plant and trunks for Kentville area- protects the ground-water supply. - some water for fire protection. - some storm drainage in new areas.	- a great deal of retrofitting of long established communities; designated growth centres under the Development Plan also received infrastructure for future development. - in general, these projects helped to encourage higher densities and infill in the growth centres, goals of the plan (then in development).	- in 1979, the County introduced an innovative development plan which aims to protect the agricultural resource of the valley. - levels of rural residential development have been traditionally high. - the plan may be hampered by its severance policy; it will be several years before an assessment can truly be made.

[a] K= thousands; l= loans; g= grants.

APPENDIX B: THE NATURE OF CMHC-SUBSIDIZED DEVELOPMENT (CONTINUED)

Centre/Area (Urban Population of CMA, 1976)	CMHC Funding[a]	Infrastructure Assisted	Nature of Subsidized Development (MIP Only)	Land Planning Context
QUÉBEC:				
Trois-Rivières (inc. Cap-de-Madeleine and Ste-Marthe-du-Cap-de-Madeleine; 96,954)	STP- Nil MIP- $ 1,380 K l[a]	- mainly storm trunk sewers for new growth.	- development at Trois-Rivières was new, contiguous, but not planned, subdivisions inside the city limits. - took place on forested land. - at Cap-de-Madeleine, an area subject to flooding was subsidized.	- there is no municipal plan; a regional urban community is in the works for this area. - Québec government has required developer to pay 80% of all servicing costs since 1977. - the green zone under Bill 90 adopted in 1978 was not a factor.
Sherbrooke (inc. Lennoxville, Fleurimont, and Rock Forest- the surrounding towns; 94,691; Case J)	STP- $ 262 K l MIP- $ 1,539 K l	- Sherbrooke- nil; - Lennoxville- storm, retrofit mainly; - Fleurimont- all pipe types, new; - Rock Forest- storm and water, new.	- Fleurimont/Rock Forest- new contiguous growth; unplanned development, dispersed, and not logical.	- developers are the main shapers of urban development in the area. - agriculture not a major land use surrounding the centre.
Victoriaville (27,732)	STP- Nil MIP- $ 180 K g[a]	- all types of services for new growth.	- new unplanned, but contiguous development within urban boundaries. - mainly developed on current or abandoned agricultural land. - a low density development- 9 units per hectare- was subsidized.	- a storm relief project was a necessary precursor for development in one case due to low relief. - no municipal plan. - the province's agricultural land protection law (green zone) is a factor.
Hull (Communauté régionale de l'Outaouais- CRO; 182,773)	STP- $17,526 K l MIP- $60,549 K l - $ 1,917 K g	- regional interceptor sanitary system- trunk sewers/pumping stations at Aylmer, Gatineau, and along Ottawa River. - treatment plants at Gatineau and Aylmer. - sewage system was a joint project with region, National Capital Commission, and Québec. - water filtration plant and reservoir for north of Hull.	- servicing was for retrofit and new, largely-contiguous development. - CRO was greatest user of MIP in Quebec after Montréal.	- CRO's land-use plans have been in effect since 1977. - surrounding land not of high agricultural capability.

[a] K= thousands; l= loans; g= grants.

APPENDIX B: THE NATURE OF CMHC-SUBSIDIZED DEVELOPMENT (CONTINUED)

Centre/Area (Urban Population of CMA, 1976)	CMHC Funding[a]	Infrastructure Assisted	Nature of Subsidized Development (MIP Only)	Land Planning Context
MONTRÉAL (2,801,262):				- population of CUM (Island of Montréal) declined by almost 220,000 people between 1971 and 1981, although the suburban areas gained over 280,000 (especially on the south shore).
- Montréal - Communauté urbaine (CUM; entire island of Montreal)	STP- $23,451 K l[a] MIP-$266,296 K l $ 2,726 K g[a]	- STP - mainly collector sewers (sanitary; $10.5 million). - MIP - sanitary interceptor sewers and sewage treatment plant for Island of Montréal.	- CMHC provided very substantial support to the regional sewerage master plan.	- industrial expansion is mainly taking place in the west and east as opposed to the centre of the island.
- Montréal-Pierrefonds (north-western portion of island of Montréal)	STP- $ 713 K l MIP- $ 653 K l $ 119 K g	- sewage pumping station. - storm trunk sewer and water supply projects.	- aided the development of two ten-storey apartment buildings and therefore raised the density of population. - aided development a subdivision contiguous to previous urban development.	- Pierrefonds is a relatively low-density residential area, still surrounded by agriculture (green zone).
-Montréal- Laval (large island north of Montréal)	STP- $ 8,732 K l MIP- $13,595 K l $ 722 K g	- all types of piped services; two-thirds of loans were for sewage trunks. - to empty to CUM interceptor.	- promoted contiguous new development - almost infill. - not planned, yet it occurred in in desireable areas.	- surrounding land is not now protected under green zone (Bill 90). - although development is occurring on agricultural land, the high quality agricultural land is away from developed/developing areas. - primary land-use influence comes from the already developed, extensive network of highways. - during the MIP, Laval was experiencing rapid growth.
- Montréal-Châteauguay (on s. shore of St. Lawrence	STP- $ 13 K l MIP- $ 437 K l $ 60 K g	- projects- one sanitary sewer, one storm sewer, one water supply. - 70% of funds to the storm sewer.	- largely used for existing areas- 60-70%- i.e. retrofit. - storm sewers were used to solve an existing flood problem with the Chateauguay River and to open up some new land previosuly subject to floods for development.	- city is surrounded by high-quality black soil, the best in Québec, but it is not a fast growing area. - it is linked to CUM sewage system.

[a] K= thousands; l= loans; g= grants.

APPENDIX B: THE NATURE OF CMHC-SUBSIDIZED DEVELOPMENT (CONTINUED)

Centre/Area (Urban Population of CMA, 1976)	CMHC Funding[a]	Infrastructure Assisted	Nature of Subsidized Development (MIP Only)	Land Planning Context
ONTARIO:				
Guelph (67,538)	STP- $ 1,978 K l[a] MIP- $ 354 K l - $ 918 K g[a]	- expansion of infrastructure for new growth mainly.	- planned, contigous single-family subdivisions within within the city limits.	- all development surrounding Guelph must take place onto high quality agricultural land. - City tries to avoid shotgun development.
Chatham (38,685)	STP- $ 2,733 K l MIP- $ 270 K g	- development of retrofit sanitary sewage system under the STP. - MIP received only minor use for new development.	- new development was planned, contiguous low-to-medium density, and within the city limits. - some flood-prone lands were provided drainage so that development was possible.	- all surrounding lands are CLI classes 1 and 2. - there is little rural residential development around Chatham although there is some strip development. - however, 40% of the workforce comes from outside city. - only one of the three surrounding townships has an official plan. - therefore, promotion of urban settlement by servicing helps support local planning and eases pressures on the surrounding rural lands.
Huron County (Case A)	STP- $ 858 K l MIP- $ 1,540 K l - $ 78 K g	- STP allowed initial development of many of the systems. - MIP permitted expansion of the sewerage systems for growth.	- any development within these agricultural service communities required sewerage system expansions, due to provincial health regulations.	- if sewerage systems of the towns had not been expanded, pressures for rural residential development would no doubt have triumphed.
WINDSOR (223,922; Case F):				
- City	STP- $22,800 K l MIP- $ 1,578 K l $ 516 K g	- development of sewage treatment plants and trunk lines. - largely storm drainage under MIP.	- MIP subsidized a mixture of retrofit with tight-in contiguous and infill development (low density-single family) within city limits.	- there is no regional government or system of co-ordination of planning between the two bodies. - Windsor-Essex County are located on some of Canada's finest agricultural land. - much scattered residential development (Lands Directorate,
- Essex County	STP- $ 5,087 K l MIP- $ 6,978 K l - $ 2,111 K g	- retrofit of services in small towns under STP.	- on other hand, some subsidy of less contiguous, less logical growth in areas around the city (e.g., Sandwich West, Sandwich East) by these same treatment plants and direct services. - otherwise in the County, services for towns were assisted only as outlined by official plans and adjacent to smaller centres.	- City has much potential for infill due to several large sectors fragmented by speculation in the twenties; CMHC is assisting the city with a pilot project to determine if assembly of this land is possible; this clearly represents an appropriate direction for growth. 1983).

[a] K= thousands; l= loans; g= grants.

APPENDIX B: THE NATURE OF CMHC-SUBSIDIZED DEVELOPMENT (CONTINUED)

Centre/Area (Urban Population of CMA, 1976)	CMHC Funding[a]	Infrastructure Assisted	Nature of Subsidized Development (MIP Only)	Land Planning Context
Niagara (295,860- St. Catharines- Niagara CMA; inc. only rural areas below the escarpment; Case G)	STP- $ 395 K l[a] MIP- $10,826 K l	- to provide services for new areas and to solve certain health problems.	- subsidies largely supported single-family subdivisions in the towns. - Grimsby-Lincoln sewage treatment plant.	- development on these lands was the subject of on-going, vociferous controversy throughout the late 1970s until a final Ontario Municipal Board decision in 1981, which set urban development boundaries and included a strict severance policy.
PRAIRIES:				
Winnipeg (560,874; Case B)	STP- $28,350 K l MIP- $16,849 K l $ 675 K g[a]	- a variety of services provided- retrofit and new development.	- contiguous, planned (long-term) development within city limits. - single family densities. - some land drainage relief to allow development.	- provision of ample serviced areas close-in has allowed successful resistance of pressures to allow non-contiguous, scattered development (Warren, 1982). - city, province, and public are well aware of flood hazards due to 1950 flood; little pressure for development of flood-prone areas.
Regina (149,593; Case C)	STP- $ 3,600 K l MIP- $ 761 K l $ 464 K g	- services for new development.	- contiguous, planned (long-term) development in two sectors within the city limits. - single-family densities have occurred, although somewhat higher densities were planned.	- city plan (Regina, RSVP; City of Regina, 1977) considered all pertinent constraints to development, although virtually all surrounding land was CLI class 2. - urban expansion largely contiguous (see Rump and Brennan, 1982).
Lethbridge (46,752)	STP- $ 3,287 K l MIP- $ 112 K g	- STP- improvements and extensions to two small sanitary trunks. - MIP- two storm trunks.	- subsidized two planned, phased developments in W. Lethbridge, contiguous and within city limits. - primarily single-family density.	- City of Lethbridge is the major developer in the area. - City has faithfully followed its long-term development plan. - agricultural land is of reasonably uniform distribution around Lethbridge.

[a] K= thousands; l= loans; g= grants.

APPENDIX B: THE NATURE OF CMHC-SUBSIDIZED DEVELOPMENT (CONTINUED)

Centre/Area (Urban Population of CMA, 1976)	CMHC Funding[a]	Infrastructure Assisted	Nature of Subsidized Development (MIP Only)	Land Planning Context
BRITISH COLUMBIA:				
Chilliwack (21,746; Case E)	STP- $ 3,182 K l[a] MIP- $ 983 K l $ 53 K g[a]	- services for new development.	- contiguous growth in two small areas within urban boundaries of the B.C. Agricultural Land Reserves (ALR).	- no official plan at that time; official plan now recognizes importance of agricultural land base and the ALR. - city is surrounded by rich agricultural lands of Fraser Valley. - areas developed were the last outside ALR in valley; now will have to expand onto the nearby plateau (Cascade Mountains). - entire city is subject to flood problems- BC government restricts zoning changes for this reason.
Victoria (195,135)	STP- $ 3,233 K l MIP- $ 5,164 K l - $ 337 K g	- to solve service problems in developing rural areas and various existing rural and urban pollution problems (retrofit).	- servicing allowed development to take place. - quite low density development.	- considerable scattered rural development taking place north of Victoria in Saanich Peninsula (Kerr, 1983).

[a] K= thousands; l= loans; g= grants.

OTHER FEDERAL IMPACT REPORTS

Barr, Lorna R. 1980. The Land Impact of Federal Programs in the Cowichan Valley Regional District, British Columbia. Working Paper No. 4. En 73-4/4E. Free.

Bircham, Paul D. 1983. The Impact of Federal Activities on Fruitland Use: Annapolis Valley. Working Paper No. 21. En 73-4/21E. Free.

Interdepartmental Committee on Land. 1982. The Identification of Impacts of Federal Programs on Land Use: A Manual for Program Managers. Free.

McCuaig, J. and E.W. Manning. 1980. The Effects on Land Use of Federal Programs in the Windermere Valley. Working Paper No. 8. En 73-4/8E. Free.

McCuaig, J. et al. 1981. The Land Use of Small Craft Harbours: A Preliminary Investigation. Working Paper No. 11. En 73-4/11E. Free.

Ryle, S.G. and P. Gervason. 1980. The Impact on Agricultural Land Use of Federal Policies and Programs in Kings County, Nova Scotia. Working Paper No. 5. En 73-4/5E. Free.

WORKING PAPERS SERIES

No. 1: "The Ecology of Reclamation of Land Disturbed by Mining: A Selected Bibliography". I.B. Marshall, 1980. En 73-4/1E. ISBN 0-662-50724-X.

No. 2: "Analysis of the United States Experience in Modifying Land Use to Conserve Energy". W.R. Derrick Sewell and Harold D. Foster, 1980. En 73-4/2E. ISBN 0-662-10867-1.

No. 3: "The Influence of Exurbanite Settlement on Rural Areas: A Review of the Canadian Literature". James D. McRae, 1980. En 73-4/3E. ISBN 0-662-11085-4.

** No. 4: "The Land Impact of Federal Programs in the Cowichan Valley Regional District, British Columbia". Lorna R. Barr, 1980. En 73-4/4E. ISBN 0-662-11086-2. **

** No. 5: "The Impact on Agricultural Land Use of Federal Policies and Programs in Kings County, Nova Scotia". S.G. Ryle and P. Gervason, 1980. En 73-4/5E. ISBN 0-662-11087-0. **

No. 6: "Energy Conservation Through Land Use Planning: A Synthesis of Discussions at a Symposium held in Montreal 26-28 March 1980". W.R. Derrick Sewell and Harold D. Foster, 1980. En 73-4/6E. ISBN 0-662-90812-0.

No. 7: "Assessment Procedures in Canada and Their Use in Agricultural Land Preservation". James D. McCuaig and Heather J. Vincent, 1980. En 73-4/7E. ISBN 0-662-11089-7.

No. 8: "The Effects on Land Use of Federal Programs in the Windermere Valley". J.D. McCuaig and E.W. Manning, 1980. En 73-4/8E. ISBN 0-662-11117-6.

No. 9: "Issues in Canadian Land Use". E.W. Manning, 1980. En 73-4/9E. ISBN 0-662-51142-5.

No. 10: "The Development of an Ecological Sensitivity Rating for Acid Precipitation Impact Assessment". Background Paper on Results of a Meeting on LRTAP Sensitivity Indices, Canada/United States Impact Assessment Working Group, Detroit, Michigan, December 2, 1980. D.W. Cowell, A.E. Lucas, and C.D.A. Rubec, 1980. En 73-4/10E. ISBN 0-662-11451-5.

** No. 11: "The Land Use Impacts of Small Craft Harbours: A Preliminary Investigation". J.D. McCuaig, E.W. Manning, V.P. Neimanis, and E.M. Peterson, 1981. En 73-4/11E. ISBN 0-662-11453-1. **

No. 12: "Land and the Automobile: A Selected Bibliography". Wendy Simpson-Lewis and Ruth McKechnie, 1981. En 73-4/12. ISBN 0-662-51259-6.

No. 13: "The Agricultural Use of Marginal Lands: A Review and Bibliography". K.G. Beattie, W.K. Bond, and E.W. Manning, 1981. En 73-4/13E. ISBN 0-662-11454-X.

No. 14: "Land Use Classification Systems: An Overview", 1981. Robert C. Scace, 1981. En 73-4/14E. ISBN 0-662-11434-5.

No. 15: "Survey of User Requirements for Land Use Data: Canada Land Use Monitoring Program". D.M. Gierman, 1981. En 73-4/15E. ISBN 0-662-11435-3.

No. 16: "Problems in Mapping Non-productive Woodland Using the CLI Present Land use Classification in Halifax County, Nova Scotia". Peter N. Duinker, 1981. En 73-4/16E. ISBN 0-662-11436-1.

No. 17: "Land Use Classification for Land Use Monitoring". D.M. Gierman, 1981. En 73-4/17E. ISBN 0-662-11439-6.

No. 18: "Literature Review and Annotated Bibliography on the Earth Science of the Hudson Bay Lowland". D.W. Cowell, 1981. En 73-4/18E. ISBN 0-662-11539-2.

No. 19: "Characteristics of Terrestorial Ecosystems Impinged by Acid Precipitation Across Canada". C.D.A. Rubec, 1981. En 73-4/19E. ISBN 0-662-11562-7.

No. 20: "An Inventory of Federally Maintained Land Data. A. Petch and Sandy Macenko, 1982. En 73-4/20E. ISBN 0-662-11880-4.

** No. 21: "The Impact of Federal Activities on Fruitland Use: Annapolis Valley". Paul D. Bircham, 1983. En 73-4/21E. ISBN 0-662-11959-2. **

No. 22: "The Impact of Exurbanite Settlement in Rural Areas: A Case Study in the Ottawa-Montrea Axis". James D. McRae, 1982. En 73-4/22E. ISBN 0-662-11788-3.

No. 23: "A Method to Assess the Implications of Future Urban Expansion on Rural Land". Chris Cocklin and Barry Smit, 1982. En 73-4/23E. ISBN 0-662-12058-2.

No. 24: "Area Sampling Strategies in Relation to Land Use Monitoring Needs and Objectives". C.R. Bryant and L.H. Russwurm, 1983. En 73-4-24E. ISBN 0-663-12320-4.

No. 25: "Methods of Preserving Wildlife Habitat." Bill Haigis and Will Young, 1983. En 73-4-25E. ISBN 662-92035-X.

No. 26: "Land Use Change on Wetlands in Southern Canada: Review and Bibliography." P. Lynch-Stewart, J.E. Moore, and C.D.A. Rubec, 1983. En 73-4/26E. ISBN 662-12675-0.

No. 27: "An Overview of Crown Land Management in Canada". S.L. Macenko and V.P. Neimanis, 1983. En 73-4/27E. ISBN 662-12629-7.

No. 28: "The Land Planning Framework of Canada: An Overview". R. Audet and A. Le Hênaff, 1984. En 73-4/28E. ISBN 662-12793-5.

No. 29: "The Retreat of Farmland in the Gaspé: The Causes and the Impacts on Land Use". Diane Lamoureux (not yet published). En 73-4/29E. ISBN 662-12799-4.

No. 30: "Foreign Land and Real Estate Ownership in Canada". E. Neville Ward, 1984. En 73-4/30E. ISBN 662-13078-2.

No. 31: "Marginal Land Utilization and Potential Kent County, New Brunswick". Maurice Mandale, 1984. En 73-4/31E. ISBN 662-13079-0.

** No. 32: "The Impacts on Land Use of CMHC's Municipal Infrastructure Assistance, 1961 to 1980". Paul Bircham, 1984. En 73-4/32E. ISBN 662-13101-0. **

** No. 33: "The Impact of federal government activities on land use in Renfrew County, Ontario". Nicole Lavigne, 1984 (not yet published). En 73-4/33E. ISBN 662-13113-4. **